Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. Arya Samaj Foundation Chennai and eGangotri

Jnl. of The Bombay Natural History Soc.

Vol. 21 1912

Public Domain. Gurukul Kangri Collection, Haridwar

48917
Digitized by Arya Samaj Foundation Chennai and eGangotri

गुरुकुल कांगड़ी विश्वविद्यालय, हरिद्वार
पुस्तकालय

R

विषय संख्या 590.5
पुस्तक संख्या B63J
आगत पंजिका संख्या V. 21

पुस्तक पर किसी प्रकार का निशान लगाना वर्जित है। कृपया १५ दिन से अधिक समय तक पुस्तक अपने पास न रखें। 48,917

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

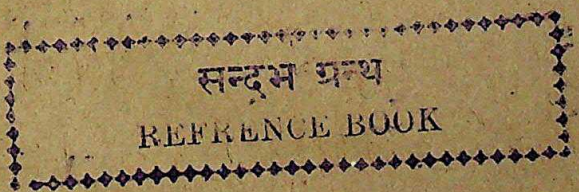
R
590.5
B63 J
48,917
V. 21/A

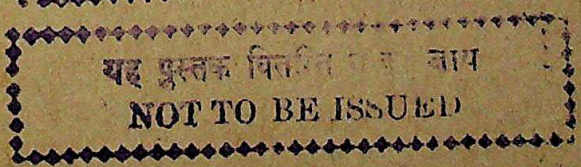
पुस्तकालय

गुरुकुल कांगड़ी विश्वविद्यालय, हरिद्वार

पुस्तक-वितरण की तिथि नीचे अंकित है। इस तिथि सहित १५वें दिन तक यह पुस्तक पुस्तकालय में वापिस आ जानी चाहिए। अन्यथा ५ पैसे प्रतिदिन के हिसाव से विलम्ब-दण्ड लगेगा।

स्थक नमाणीकरण १९८४-१९


सन्दर्भ ग्रन्थ
REFRENCE BOOK


यह पुस्तक वितरित [illegible] जाय
NOT TO BE ISSUED

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

590.5, B63J
48917

THE

JOURNAL

OF THE

BOMBAY NATURAL HISTORY SOCIETY.

EDITED BY

W. S. MILLARD,

R. A. SPENCE and N. B. KINNEAR.

VOL. XXI., NO. 4

Date of publication. 20th Nov. 1912.

Price to Non-Members ... ... Rs. 10–0.

PRINTED AT THE TIMES PRESS.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CONTENTS OF THIS NUMBER.

PAGE

THE GAME BIRDS OF INDIA, BURMA AND CEYLON. Part VIII. The Bengal Florican (*Sypheotis bengalensis*). *(With Plate VIII.)* By E. C. Stuart Baker, F.L.S., F.Z.S., M.B.O.U. 1109

ORCHIDS OF THE BOMBAY PRESIDENCY. Part XIII. By G. A. Gammie, F.L.S. 1129

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA. Part XII. *(With Plates I and J.)* By T. R. Bell, I.F.S. ... 1131

NOTES ON A BIRD COLLECTING TRIP IN THE BALAGHAT DISTRICT OF THE CENTRAL PROVINCES. By E. A. D'Abreu, F.Z.S. 1158

THE BOMBAY NATURAL HISTORY SOCIETY'S MAMMAL SURVEY OF INDIA. REPORT ON COLLECTION NO. 5 FROM DHARWAR. With a Plate. By R. C. Wroughton, F.Z.S. 1170

A LIST OF BIRDS FROM ARAKAN. By Cyril Hopwood, I.F.S. 1196

THE MOTHS OF INDIA. Series IV, Part V. By Sir George F. Hampson, Bart., F.Z.S., F.E.S. *(With Plate G.)* 1222

THE FUNGI OF INDIA. Part I. *(With Plates I to IV and text figures 1 to 10.)* By F. Theissen, S. J. 1273

MORE BIRD NOTES BY THE WAY IN KASHMIR. By Lt.-Col. H. A. F. Magrath 1304

PROGRESS OF THE MAMMAL SURVEY 1315

MISCELLANEOUS NOTES:—

I.—Tiger (*Felis tigris*) killing and eating its young. By James W. Best, I.F.S. 1318

II.—Cannibalism among Panthers (*Felis pardus*). By Major J. R. Carter 1319

III.—Number of a panther's (*Felis pardus*) caudal vertebræ. By Captain A. H. Mosse, I.A. 1319

IV.—Notes on Martens in Kashmir. By Lt.-Col. H. A. F. Magrath 1320

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

THE BENGAL FLORICAN (Sypheotis Bengalensis).

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

JOURNAL
OF THE
Bombay Natural History Society.

Nov. 1912. VOL. XXI. No. 4.

THE GAME BIRDS OF INDIA, BURMA AND CEYLON.

BY

E. C. STUART BAKER, F.L.S., F.Z.S., M.B.O.U.

PART VIII.

With Plate VIII.

(*Continued from page 739 of this Volume.*)

SYPHEOTIS BENGALENSIS.

The Bengal Florican.

Otis bengalensis.—Gm. Syst. Nat. i, p. 724 (1788); Hodgson, J. A. S. B., xvi, p. 883.

Otis delicosa.—Gray and Hardw., Ill. Ind. Zool., i, pp. 61 and 62.

Sypheotides bengalensis.—Blyth, Cat. B. Mus. As. Soc., p. 258; Jerdon, B. of Ind. iii, p. 616; Godwin Austin, J. A. S. B. xiv, part II, p. 84.

Sypheotis bengalensis.—Hume, Nests and Eggs, p. 559; *id.*, Hume and Marsh., Game B. i, p. 23, iii, p. 424; Hume, Cat. No. 838, Str. Feath. viii, p. 111; *ibid*, ix, p. 199; Markham, *ibid*; Fasson, *ibid*, p. 200; Butler, *ibid*, x, p. 162; Hume and Cripps, *ibid*, xi, p. 312; Oates in Hume's Nest and Eggs, 2nd Edit. iii,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

p. 378; Finn, Indian Waders, p. 123; Inglis, Journal B. N. H. Soc. xiv, p. 766; *id, ibid*, xvi, p. 73; Wall, *ibid*, xvi, p. 388; Stuart Baker, *ibid*, xvii, p. 538.

Houbaropsis bengalensis.—Sharpe, Cat. B. M. xxiii, p. 315; *id.*, Hand L. i, p. 175; Oates, Cat. Eggs. B. M. i, p. 88; *id.* Game B. of Ind. i, p. 414.

Vernacular Names.—Charas, Chars, Charat, *H*; Dahar, Ablak ♂ Bor ♀, *Terai*; Ulamora, *Assamese*; Dao-tiriling, *Cachari*.

Description, Adult male.—Whole head, neck and lower parts very glossy black, in some lights shewing a distinct blue or purplish sheen, more especially on the feathers of the breast and crest. Back black, each feather with two broad bars of buff mottled with black, the general appearance of the back being thus a mottled black and buff, the former predominating. The bases of the feathers are black and in quite freshly plumaged birds there is a narrow buff fringe to the tips of the feathers, which, however, soon gets abraded off so that the tips generally appear black. Inner scapulars like the back, but the mottlings are even more irregular, the centres to the feathers are chiefly black and the surrounding portions vermiculated buff and black. Tail, four centre feathers like the back, but the outermost are entirely black with narrow white tips and the intermediate feathers grade from one to the other. Outer scapulars black, a few of the feathers more or less mottled with buff, on the inner webs, inner secondaries like the back, but with numerous bars of black, not always the same in number; remaining quills white, except the outer webs and part of the inner webs of the first and second primary, which are black; in some birds the outer web of the third primary is also nearly all black and this black diminishes in extent on each succeeding quill, remaining only as a black tip to the outer webs of the innermost primaries and disappearing altogether on the outer secondaries. The shafts of all the wing quills are black.

Bill, upper mandible dark brown, sometimes with a leaden tinge, lower mandible paler and more leaden and often with a yellow tinge on the basal two-thirds. Iris brown, Hume says sometimes yellow. Legs straw yellow, sometimes with a tinge of green or plumbeous.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Wing 13·2″ to 13·75″; bill, from feathers above nostril on culmen, 1·2″ to 1·25″, from gape 2·12″ to 2·44″; tarsus about 5″ or a little over; tail 6·5″ to 7·25″.

Tarsus 5·6″ (Blanford).

Tarsus 6·12″ to 6·75″ (Hume).

The feathers of the crest are long and somewhat lanceolate and measure from 3″ to 4″ or even more. The feathers of the hind neck average about 2″ and below the neck they increase gradually in length from the tiny feathers of the chin to feathers on the fore neck of over three inches and to the final tuft of feathers on the breast which may be as long as six inches in old, fully plumaged birds.

In some birds which are more than usually richly coloured there is often a rufescent shade in the buff colour on the upper parts.

Adult female and male in first plumage.—Crown, dark brown, sometimes almost black, with a certain amount of buff speckling and buff edges to the posterior feathers; a broad coronal streak of mottled brown and buff; supercilia and lores buff, generally immaculate but the former sometimes with a few dark specks: feathers of short crest buff speckled with black or brown and with dark centres and shafts. Chin, upper throat and centre of lower throat buff or sand colour unspotted, remainder of neck sandy buff freckled and narrowly barred with black or brown, the bars not being definite enough to make the neck look more than freckled. Down each side of the neck the feathers are centred with dark streaks, making two fairly definite lines which coalesce on the neck adjoining the breast, the feathers of this part seem often to be a richer shade of buff than elsewhere on the plumage. The back, scapulars and inner secondaries are black, mottled and freckled with buff except in the centre of each feather and with broad sub-edges of buff in a V. shape. On the secondaries and outer scapulars the markings are bolder and the black assumes the shape of fairly definite bars. Wing coverts pale buff with a rufous tint here and there and with sparse markings in the form of broken bars of black or deep brown, not numerous enough or regular enough to break the general contrast of these pale buff feathers with the plumage of the back. Remainder of wing quills

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

black, the outermost feather with a faint suggestion only of mottled bars of buff on the inner web, these increasing in extent until the whole of the inner secondaries are mottled black and buff. Rump like the back but less broken with buff; tail mottled black, or brown, and buff, the mottling decreasing in extent on the outer tail feathers which are fairly distinctly barred with broken black and buff. Upper breast and edge of flanks buff speckled with black or brown like the neck; flanks, where covered with wing, mottled with black; remainder of lower parts pale, sandy buff, often slightly darker on the under tail coverts which are sometimes speckled with dark brown.

Irides yellow, dingy to almost golden, bill like that of the male but paler and often fleshy towards the base of the lower mandible; legs dingy yellow or straw colour. Wing 13·2" to 14·50"; bill at front 1·50" to 1·54" and from gape 2·2" to 2·5"; tarsus 5·6" or over; tail 6·5" to 7·25".

The measurements given above for males and females, which are taken from a series of 14 males and 11 females, all fully adult, would seem to shew that the females are very little larger than the males, but this is not really the case as she is a far heavier and more bulky bird. I have two records of exceptionally heavy cocks, one shot by Mr. Mundy in Dibrugarh, Assam, and another by Mr. J. Harrison of the same district, which both weighed between 3½ and 3¾ lbs. Most males, however, are less than 3 lbs. in weight, young cocks of the year seldom exceeding 2½ lbs. Females, on the contrary run up to 5 lbs., a weight which has been recorded by Mr. A. Primrose and others; they often exceed 4 lbs. and even females of the first year seldom weigh less than 3½ lbs.

Young male.—The young male is at first like the female and commences to assume the adult male plumage in the second year, that is in its first spring moult, but probably often reverts, more or less, to female plumage in its autumn moult, retaining, however, the white wing-coverts of the adult male.

The complete adult plumage of the male is assumed in the most irregular manner, and at the first spring moult the young cock bird may assume any portion of the adult plumage retaining elsewhere

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

that of the female. Nearly always, however, the white wing feathers are amongst the earliest to shew themselves.

Some young birds first moult into the adult black plumage from the breast downwards, having this part wholly glossy black, although, with the exception of the wings, the rest of the body remains clothed in female garb. Other young males retain their first feathering on the upper parts, but commence to assume the black feathers of the throat as well as that of the lower parts in a lesser degree. One such specimen I have examined has the whole of the upper part in juvenile plumage with the exception of a few white feathers amongst the wing-coverts; below, from the chin to the breast the black feathers are growing profusely, though there are still a few feathers here and there retaining their original vermiculated appearance; from the lower breast downwards the whole lower plumage is a soiled white, with a good many black feathers showing all over as well as a few vermiculated ones.

This young bird is a most interesting one as it would appear that sometimes, whilst the upper breast, neck, head and upper parts assume the adult plumage directly, though by varying degrees; the plumage of the lower parts goes through a transition stage. The whole of the buff in the bird has been replaced with white, though there are but few of the adult black feathers yet showing.

The question as to whether the Florican has a separate breeding plumage and changes back again during the autumn moult into a non-breeding, or post-nuptial plumage may, I think, be now decided to the contrary.

Blyth is responsible for the generally accepted theory that the cock-bird changed into a semi-female plumage in autumn which it regained the succeeding spring, and doubtless he had then a good deal of information before him on which to ground his arguments. Blyth writes "Mr. Hodgson is also certainly mistaken in his assertion that the nuptial dress is worn permanently, as we have witnessed the change before described and the subsequent partial removal of the breeding livery, which latter was not well developed in captivity, and have likewise observed the fact in the skins of wild birds." Hodgson, on the other hand, says "The

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

moults are two annually, one from March to May and the other autumnal, which is less complete and more speedily got over, between August and October. The young males, up to the beginning of March, entirely resemble the females, but the moult then commencing gradually assimilates them to the adults, which never lose, as the lesser species or Likh does, after the courting season, the striking black and white garb that in both species is proper to the male sex, and permanently so to the larger species after the first year of age. There is, properly speaking, no nuptial dress in this species, though the hackles and crest in their most entire fulness of dimensions may be in part regarded as such."

Now this statement of Hodgson's seems to be entirely correct, except as regards one important particular. He considers, as we have seen, that the Bustard assumes adult plumage in two moults, or even in one, and that after the *first* year the young bird retains permanently its adult colouration; I would change first year to second year.

We know now that just as many fully plumaged adult males are seen during the cold weather, say from November to the end of February as at any other time of the year. I have seen magnificent specimens of cocks moulting in April from adult plumage to adult plumage. But, on the other hand, I have several times seen *non-adult* cock-birds, which were in an intermediate stage remoulting in autumn and shewing some new feathers coloured as in the female. From this we may, I think, infer that it takes the young cock at least two years before it assumes the full plumage of the breeding cock. It will be seen that Blyth does not say that his Bustard, after having a retrograde moult, then moulted in the succeeding moult into full feathering, but he puts down this failure to assume the fully adult garb to the effects of captivity. The facts, in reference to the assumption of the fully adult plumage, appear to be these. In the autumn moult of its first year the young male bird retains its female plumage, but in the succeeding spring moult acquires a colouration intermediate between the two sexes. The autumn moult of the second year may often see the young cock lose a certain amount of the colouring he had gained in the spring, but at the next spring moult he goes further still

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

towards the plumage of the adult, and on the completion of this moult, when he is just under two years old, he either obtains the adult plumage in full or else he does so at the second yearly moult in the autumn. From this time onwards there is no further retrograde step. Of course, I have seen very many cocks in the winter in either wholly female or half stage feathering but these have been small birds which, though they were sometimes very fat and in prime condition, never weighed more than 2 to 2½ lbs. There is no doubt that a cock Florican takes at least two years to grow to his greatest size and weight, and it is but natural that his dress should keep pace with his growth and that he should not arrive at his full splendour of plumage until he also arrives at his full vigour and size.

Distribution.—Although so many years have passed since Hume described the habitat of the Florican, there is but little to add to his account; he says "The Bengal Florican is almost confined to Eastern Bengal, the valley of Assam, the Bhutan Dooars, and those portions of Bengal, Oudh and the North-Western Provinces lying North of the Ganges. Jerdon says that it spreads through the valley of the Jumna into Rajputana, the Cis-Sutlej States, and parts of the Punjab; but this is wrong. It is the Houbara that is found in these localities, not the Bengal Florican; but sportsmen constantly call the Houbara the Florican, and hence the mistake. I have never seen the true Florican anywhere west of the Kadar of the Ganges, except as a rare straggler in the Dun; and there again it does not, to the best of my belief, extend further than the Kadar of the Jumna. In Meerut I have killed both the Houbara and the Likh, but it is only when you get quite down into the Kadar of the Ganges at Hastinapur and Makhdumpur, or again southwards below Garhmuktesar, that you meet the true Florican, and here we used to pick up a few couples every cold season.

"This species has been recorded from Tipperah and Sylhet, but Captain Williamson tells me he has never seen it in the latter, and both he and Mr. Inglis say the same as regards Cachar.

"This Florican is essentially Indian, and extends so far as we know, nowhere beyond the limits of the empire. It is *possible*,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

however, that it may hereafter be found to occur in the country immediately East of Assam."

To this, in a footnote, Hume adds that it is certainly to be found as far west as Nuddea.

Roughly speaking, this beautiful Bustard is confined to the grass land area North and East of the Ganges and on either side of the Brahmapootra ; outside of this it is but a straggler. My furthest record South-East is from the district of Chittagong, whilst in the Assam Valley it extends to the extreme Eastern limit of the grass lands and churs bordering the Dihong, Dibong and Brahmapootra Rivers running right up to the very foot of the Hills, both to East and North. It is found in the Terai in some numbers, wherever the country is suitable, and in the same way throughout the Dooars, South of Nepal and Bhutan. In Assam it is common in many districts and extends all through the Assam Valley from Rungpur and Goalpara to Dibrugarh. From the Surma Valley it is shut out by the Garo, Cachar and Khasia Hills, and though it is common in parts of Nowgong to the North of these ranges it is of extreme rarity anywhere to the South of them. I have shot three birds, all young females, in Cachar, and have seen two specimens from Sylhet. Hume records it from Tippera in 1902, and finally I have received a specimen from Chittagong. But these few instances are scattered over a period of over 25 years and merely emphasize the fact of their great rarity, South of the Brahmapootra Valley.

As Col. Graham gave such a detailed account of the numbers in which the Florican was to be found in former times in each Assam district, it may be as well here to give also an idea as to how they are now distributed. Col. Graham writes : "The Bengal Florican may be said to extend throughout the Assam Valley, from the Manas River, on the West, to the Mishmi Hills, East of Sadiya, on the East.

"It is found in greatest numbers in high and dry open lands, the places most frequented by it being the large Bishnath plain and the higher lands lying between the Government Trunk Road on the North of Brahmapootra, and the hills throughout the Darrang districts.

"North of Mangaldai, in Darrang, about five miles from the

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Bhutan Hills, at a staging bungalow, well named Shikar, I shot fourteen Florican in one day.

"The Florican is also found on the Sadiya plains in fair numbers, and on the chars of the Brahmapootras, but it is much scarcer on the South bank of that river.

"On the Bishnath plain and other places in the Darrang district I have seen, I am sure, from 30 to 40 Florican in a day.

"Taking Assam, as a whole, I should say of the Florican:

"In Darrang, very common.

"In Kamrup and Goalpara, a good sprinkling.

"In Nowgong, Sibsagar, Lakhimpur, here and there a fair sprinkling, but, as a rule, scarce."

At the present day the Florican is still pleatiful in the Goalpara district on the North bank, breeding in great numbers in the sun-grass lands at the foot of the Bhutan Hills; from this district it extends through Kamrup, Mangaldai, Darrang and Sibsagar. North of the Brahmapootra in considerable numbers wherever there are the necessary plains of grass to be found. In North Lakhimpur it becomes less common, though it will be found, as already mentioned, right up to the foot of the Abor, Mishmi and Dafla Hills, East and North of Sadiya. South of the Brahmapootra River, though it is common in parts of Nowgong, it is elsewhere rare. In Lakhimpur and Sibsagar a fair number are shot annually south of the River, but in Kamrup and Goalpara it is decidedly rare on that bank of the Brahmapootra and it hardly ever straggles to the district of Mymensingh, which adjoins the latter, though it is common in parts of the Rangpur district to the North of the River. I should, however, note that Farren recorded it as occurring not infrequently along the borders of the Madhapore jungle in 1880.

Both in Maldah and Purnea, where 25 years ago it was common, it has now become much less so, principally owing to the spread of cultivation and the consequent destruction of its favourite haunts. In Nuddea it is not now heard of and the last killed there was by myself, this too a female, in January 1884.

In Behar it only occurs as a very rare straggler. Inglis, who has worked this part of India very thoroughly, only records five instances of its occurrence, and, of these, two concern the same bird.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

The favourite haunts of the Florican are thus well described by Hodgson, who says : "Tarai is an Indian term equivalent to Pays Bas, Landes, Marches and Marshes, of European tongues ; and the name Tarai is applied, par excellence, to a low-lying moist and rarely redeemed tract of level waste, extending outside the Sal forest along the base of the sub-Himalayas from the debouch of the Ganges to the Brahmapootra. This tract of great extent and peculiar features, is the favourite habitat of the Florican, which avoids the mountains entirely, and almost, if not quite as entirely, the arid and cultivated plains of the Doab, and of the provinces West of the Jumna. It dwells indeed, upon plains exclusively, but never upon nude or cultivated plains. Shelter of nature's furnishing is indispensable to it, and it solely inhabits wide-spreading plains, sufficiently elevated to be free from inundation, and sufficiently moist to yield a pretty copious crop of grasses, but grasses not so thick nor so high as to impede the movements or vision of a well-sized bird that is ever afoot and always sharply on the look-out. Such extensive, well-clad, yet uncultivated plains are, however, to be found only on the left bank of the Ganges and accordingly I believe that to that bank the Florican is nearly confined, and to the Tarai portion thereof."

I am afraid, however, that since Hodgson's days the Florican has become less wise, for he now-a-days often haunts grass land that is liable to inundation and indeed, throughout the cold weather, he is found on the plains bordering the rivers and on the islands in them, although during the rains these may form one vast sheet of water with the river itself.

The Florican prefers to frequent plains which are covered with thin grass, or thin grass combined with scattered scrub jungle, and much affects those tracts on which village buffalo feed and in which the grass is eaten down to some 18 inches or two feet, with here and there patches of higher grass, and others, again, bare altogether. In the same way they haunt the plains of ekra and grass after these have been burnt and the fresh crop has grown up to a foot or so but is still much mixed with the burnt and withered stems of the previous year's growth. It is only in the height of the rains and when no other cover is available for them that

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

they will ever be found in the dense grass and ekra which at these times may grow to a height of 15 feet, nor will it even then be obtained in such unless there is no other more suitable ground within many miles. Of course, when repeatedly shot at, birds will temporarily take refuge in such cover and sometimes when they are much worried either by sportsmen or village pot hunters they will lie up in heavy cover during the heat of the day, coming out to feed in the mornings and evenings.

Mr. A. Primrose, who was for some years in Goalpara, in writing to me about the Florican says:—"It has a very decided predilection for certain spots, and if you kill the present occupant another is sure to be very shortly found in the same place; one such spot was the grazing ground of the Mornai Tea Estate and on this piece of land I must have accounted for fully a dozen birds and my predecessor for as many more."

"The birds, as a rule, in grass land, lie very close and rise generally well within shot and as they are not what I should call good shot carriers No. 6. shot will be found quite large enough to crumple them up. As a matter of fact I have killed two or three—all females if I remember rightly—with collecting cartridges only loaded with No. 9 or 10 shot. When, however, the bird is found in open or burnt patches it is exceedingly wary and very hard to get right within shot."

"The flight, when well on the wing, while not being rapid, is strong and direct."

I have occasionally shot them when out snipe shooting flushing them from small patches of grass between the rice fields, and No. 8 or 9 shot have always been enough to tumble them over, for though big birds their plumage is soft and lax and affords little protection.

When once flushed they generally fly a good distance, sometimes a mile or so, before alighting and are then difficult to find and to flush again, as they are great runners and move on a long distance before stopping.

Hodgson says:—"The Florican is seldom found in thick cover. When he is, he lies close, so that you may flush him at your foot; but in his ordinary haunts, amid the scattered tufts of more open

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

grass plats he can be neared with difficulty only, and No. 5 shot and a good heavy gun are required to bring him down at 40 to 60 yards distance. His flight is strong with a frequent rapid, even motion of the wings, and if he be at all alarmed, it is seldom suspended under 200 to 300 yards, whilst not unfrequently it is continued so as to carry the bird wholly out of sight and pursuit. When flying the neck is extended before the body, and the legs tucked up under it, whereas the whole family of the Herons fly with neck retracted over the back and legs stretched out behind. The walk of the Florican like that of the Heron, is firm and stately, easy and graceful : he can move afoot with much speed, and is habitually a great pedestrian, seldom using his powerful wings, except to escape from danger, or to go to and from his feeding ground at morn and eve, or to change it when he has exhausted a beat.

" This species is silent and tranquil, and except in the breeding season, seldom utters a sound, but if startled its note is a shrill metallic chik, chik-chik, and the more ordinary note is the same, but softer and somewhat plaintive."

Mr. Primrose endorses this and says that on being flushed it utters a sort of chirrup, but is otherwise silent. I have myself heard them give a sound when flushed, but should have described it rather as a croak than a chirrup : other than this and the curious humming they give when courting I have not heard them make any sound.

They are not gregarious as are most other Bustards, and one bird will seldom be found very close to another.

Col. Macgregor says that he once put up four Florican within a radius of 30 yards, but this is unusual and birds are seldom found within a couple of hundred yards of one another, especially where the jungle is thin and the birds can move about freely. Once when duck shooting I saw two old cock-birds in the open within a few yards of one another, and when I sent a man round to drive them overhead he also put up a hen and my companion and I accounted for all three. Once, also, I shot two hens out of a patch of grass not a hundred yards long, and once or twice I have taken two clutches of eggs laid quite close to one another.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

R
590.5
B635
V.21
Digitized by Arya Samaj Foundation Chennai and eGangotri
98917

Big bags of Florican are seldom made, though on one occasion a so-called sportsman in Assam shot 64 of these beautiful birds in one day, during the breeding season. There had been very early and very unusually heavy rains and in consequence a vast area of grass covered plain had become temporarily submerged and for miles in every direction there was water varying in depth from a few inches to two or three feet deep. In the centre of this was a somewhat raised strip, and here all the birds from far and near had collected. The sportsman (?) walked from one end to another, bagged a dozen Florican and then when the birds had again returned and settled on the dry land, walked back and killed a lot more and this he continued to do until darkness drove him home.

Mr. Anley, writing of the Dooars, said, that he had seen as many as twenty in a morning and Mr. Damant recorded that bags of eight or ten could often be bagged in a morning at the foot of the Garo Hills.

Col. Comber also says that in many places they are common enough in Assam for ten or more to be killed in a day's shoot.

With a line of elephants there are still many places where one could pick up a dozen birds or so in a day, but shooting on foot is laborious work, for much ground has to be covered and the grass and jungle make the walking hard. Under the latter circumstances a bag of more than four or five would be good now-a-days for a single gun to get in a day's work.

It is not often, however, that a sportsman sets out to make a bag of Florican; many are killed by men out making a miscellaneous bag, but perhaps even more are killed by sportsmen on elephants returning from a day's big game shooting.

The breeding season of the Florican commences in March and extends into June, but the majority of eggs are laid in the first fortnight of April or in the last week of March.

The cock Florican, like all the rest of his family, goes in for all sorts of curious antics during the breeding season. Hodgson, as quoted by Hume, writes: "The Florican is neither polygamous nor monogamous nor migratory nor solitary. These birds dwell permanently and always breed in the districts they frequent, and

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

they dwell also socially but with a rigorous separation of the sexes, such as I fancy is paralleled in no other species. Four to eight are always found in the same vicinity, though seldom very close together, and the males are invariably and entirely apart from the females after they have grown up. Even in the season of love, the intercourse of the sexes amongst adults is quite transitory, and is conducted without any of that jealousy and pugnacity which so eminently distinguish most birds at that period.

"In the season of love, the troops of males and females come into the same neighbourhood, but without mixing. A male that is amorously disposed steps forth, and by a variety of very singular proceedings, quite analogous to human singing and dancing, recommends himself to the neighbouring bevy of females. He rises perpendicularly in the air, humming in a deep peculiar tone and flapping his wings. He lets himself sink after he has risen some fifteen or twenty yards; and again he rises and again falls in the same manner, and with the same strange utterance and thus perhaps five or six times, when one of the females steps forward and with her he commences a courtship in the manner of a Turkey cock, by trailing his wings and raising and spreading his tail, humming all the time as before.

"When thus, with what I must call song and dance, the rites of Hymen have been duly performed, the male retires to his company and the female to hers; nor is there any appearance (I have at some cost had the birds watched most closely) of further or more enduring intimacy between the sexes than that just recorded, nor any evidence that the male ever lends his aid to the female in the tasks of incubation and rearing the young.

"The procreative instinct having been satisfied, the female retires into deep grass cover, and there, at the root of a thick tuft of grass, with very little semblance of a nest, she deposits two eggs, never more or less, unless the first be destroyed. If the eggs be handled in her absence, she is sure to discover it and to destroy them herself. The eggs are of a size and shape of an ordinary domestic fowl's but one generally larger and more richly coloured than the other.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

"The female sits on her eggs about a month, and the young can follow her very soon after they chip the egg. In a month they are able to fly; and they remain with the mother for nearly a year, or till the procreative impulse again is felt by her, when she drives off the long since fully grown young. Two females commonly breed near each other whether for company or mutual aid and help; and thus the coveys,—so to speak, though they are not literally such,—are usually found to consist of four to six birds. The Florican breeds but once a year in June, July, that is, the eggs are then laid, and the young hatched in July, August."

Capt. C. B. Macgregor also describes their dance as follows: "In June and July and sometimes as late as August, I have repeatedly witnessed the performance of the nuptial dance by the cock-bird in full plumage. The bird rises from the ground and hovers with extended wings from 10 to 20 feet in the air, and thus attracts the female birds who may be within an easy distance. Twice I have noticed this dance in the evening after the sun has gone down when returning from shooting under the Daphla Hills. The Florican generally breeds in the higher plateaux of the Assam Valley, near the foot of the hills. The males have been seen also by Major Cock in full plumage in the month of May."

Mr. Primrose, also, in writing to me remarks: "The male bird makes itself very conspicuous during the breeding season from its habit of rising a few feet into the air above the grass and, after hovering a few seconds with quivering wings, again dropping to earth. Whilst thus employed the birds are so taken up with their performance that they are very easily approached and the native pot hunters take full advantage of them at this season."

The first clutch of eggs I ever took with my own hands was found for me by a Mikir, and shown to me on the 3rd June 1904. These two eggs were laid in a bare patch in an extensive field of sun-grass close to a village, the cattle and buffaloes from which had regularly fed over it. In consequence, the grass was neither very high nor very dense and was intersected in every direction by small paths, worn by the animals as they fed. These were taken at Sadiya in the Dibrugarh District and I heard of two other

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

clutches being found by sportsmen in that district, one in March and the other in July.

In 1906 and the following years I employed a large number of men to work the Terai land at the foot of the Himalayas in the Goalpara and Mangaldai Districts and succeeded eventually in obtaining a very fine series of their eggs and in all over 60 have now passed through my hands.

The result of this work shows beyond all doubt that the normal breeding season of the Florican is much earlier than has hitherto been thought to be the case. The months in which the vast majority of eggs are laid are March and April and it may be said that the height of the laying season is from the 10th March to the 15th April. Some few birds will, however, be found to be laying in May and yet a few others as late as June, but in this latter case I fancy the clutches are second layings in place of others which have been taken or destroyed.

Messrs. Shillingford, Whymper and others have certainly taken their eggs in June, and the latter assures me that he believes that June is the normal laying month for Florican in the north-western Nepal Terai. All these people have however taken but a casual nest here and there, and I still consider the weight of evidence points to the Florican being an early breeder.

The following are the dates on which I have taken, or had taken, Florican's eggs:—

28th February, Two eggs, quite fresh.
3rd March One egg do.
6th ,, Two eggs do.
7th ,, Two pairs of eggs, fresh.
14th ,, One pair, slightly incubated.
16th ,, One egg, hard set (about 20 days).
19th ,, Two pairs, one fresh, one hard set.
24th ,, Two pairs, both fresh.
25th ,, One pair, fresh.
29th ,, Three pairs, two slightly incubated, one fresh.
30th ,, One pair, slightly incubated.
3rd April, One pair, fresh.
5th ,, One pair, fresh.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

7th	April.	Two pairs, one slightly, the other much incubated.
9th	,,	Two pairs, both considerably incubated.
10th	,,	One pair, fresh.
11th	,,	One pair, incubated.
13th	,,	Three pairs, one considerably, the other two slightly incubated.
16th	,,	Two pairs, hard set.
19th	,,	One pair, would have hatched in three days or so.
23rd	,,	A single egg, much incubated.
27th	,,	Two pairs, slightly incubated.
29th	,,	A single egg, fresh.
30th	,,	A single egg, almost fresh.
5th	May,	A pair, fresh.
13th	,,	A pair, hard set.
14th	,,	A pair, hard set.
20th	,,	Two pairs, one slightly, the other considerably incubated.
25th	,,	A single egg, hard set.
31st	,,	One pair, hard set.
3rd	June,	One pair, fresh.
5th	,,	One pair, fresh.
16th	,,	Two pairs, fresh.
24th	,,	One pair, not taken away.
3rd	July,	Four eggs, close together, not taken.

Thus, of the 79 eggs recorded it will be seen that they were found as follows:—

In February,	2.
,, March,	22.
,, April,	31.
,, May,	13.
,, June,	8.
,, July,	4.

The four eggs seen in July were in some grass land which had been flooded and were actually under water when found, so that they must have been laid some time in the middle of June at latest. The gentleman who found them was after tiger at the time and did not remove them.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

In every case the eggs had been laid on the ground in small bare patches in the centre of fields of sungrass, or *uloo* grass, these being generally of considerable extent, seldom near any village or habitation, and most often surrounded by dense forests or cane jungle.

The eggs are exceptionally difficult to find owing both to the great extent of country one has to cover and to the natural cuteness of the hen bird. Unless taken absolutely unawares by the searcher she never rises direct from her nesting place when disturbed but creeps through the grass until she has got a considerable distance from it, after which she rises and flies straight away. Thus, one can never hope to find the eggs within fifty yards of where she is flushed and often they may be 200 yards from this spot. She exhibits the same care in approaching her eggs, alighting a hundred yards away and walking through the jungle up to them. Fortunately, the bird when disturbed, generally makes off in a bee line from the object disturbing her so that the egg collector, marking the spot whence she rises generally finds the eggs by working back in a straight line towards the direction whence he has come.

An Indian friend who was so kind as to look after my collectors for me and to collate notes on their breeding habits wrote to me as follows about the breeding habits of this bustard ; " A Florican lays only two eggs a year in the breeding season (April and May). Dense forests infested with ferocious animals, scarcely trodden by men, are the places where eggs are laid on the ground. The bird takes great precaution to conceal her eggs, and you can hardly find any eggs within a quarter of a mile from the place where a Florican is seen. She creeps through the forest unobserved to a great distance to lay her eggs. A very careful and extensive search is required to discover them."

Nest there is none, and the eggs are merely laid in some natural depression under shelter of a tussock of grass. Where there is no such convenient hollow the bird scratches one in the soil or lays them on the ground without taking even this much trouble.

The number laid is almost invariably two, though sometimes a single egg may be incubated. It is practically certain that neither

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

three nor four eggs are ever laid by one bird and the frequent stories recorded to this effect are groundless. It is very noticeable that of the two eggs laid incubation is generally far more advanced in one than the other, and they would appear to be laid at an interval of several days. My own collectors told me that when they found a single egg laid they often waited three to five days before the second was deposited.

Incubation would seem to take about 25-27 days, though this is only guess work. A pair found on the 5th May, and which, when tested in luke warm water, proved to be fresh, were eventually hatched on the 30th of that month and 2nd June, though neither chick survived more than a few hours.

In shape the eggs are typically very regular ovals, the ends being equal. In proportion of length to breadth they vary considerably, but remarkably little otherwise, though a few eggs may be somewhat pointed at one end and in a few other instances at both ends. Curiously enough the extremes of variations are often met with in pairs of eggs laid by the same bird.

In colouration this bird's egg is peculiarly constant, unlike the eggs of *Sypheotis aurita* (the Lesser Florican) which vary very greatly *inter se*. The ground colour is an olive green, in some cases rather brighter, in some rather more brown. The very few exceptions to this ground colour in my collection are one pair with a pale olive green, almost sea green, tint, and another pair with a pale stone grey colour.

The markings consist of small freckles, splashes and blotches, generally longitudinal in character, of brown and purple-brown, rather more profuse at the larger end than elsewhere, but nowhere very numerous. In some eggs these markings are all reduced to freckles, and in these eggs they are often very numerous, very indefinite and often equally distributed over the whole surface. In no eggs are the markings at all bold in character. In a few eggs, not, I think, one in ten, there are a few secondary markings of purple grey or dark lavender grey, but they are very indistinct and, from the colour of the ground, hard to distinguish.

The average of 62 eggs is 2·42″ × 1·76″ (= about 62·5 mm. × 44·8 mm.) and the greatest length and breadth 2·76″ and 1·85′

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

(= about 70 mm. × 47 mm.), respectively, and the smallest 2·28" and 1·67" (=57·9 mm. × 42·5 mm.).

When fresh the great majority of *Sypheotis bengalensis* eggs are decidedly a bright *greenish* olive-green, but very soon after being blown they become somewhat paler, and in a year or two often lose much of their green tint and become more an olive-brown. The gloss, also, which in newly taken eggs is generally highly developed, pales considerably with time, though some retain it for many years and few lose it altogether.

In my article on the breeding of the Florican which appeared in Volume XVII of this Journal, I commented on the close-time needed for the protection of this bird and then said that it was probable that the time selected should be from the 1st March to the 1st October. This period is especially required for females, but as the male bird is promiscuous in his courtship and takes no interest in the protection of eggs or young, the period for him might be taken from the 1st March to the 1st August.

As a matter of fact, throughout the area this bird inhabits, nature puts a practical closure on all shooting in August and September, and the extension of the shooting-season for males would have no effect. It would be excellent if the shooting of females could be altogether stopped for some years to come, as there is no doubt that the Florican is one of our Game-Birds which is seriously decreasing in numbers of late years.

The Plate of this bird requires little comment. The iris of the male should be deep brown and the upper mandible should have far less yellow or none at all. The plumage of the head and neck is also unusually thick and heavy, though a few birds may have it as dense when just moulted.

The female is excellent, but the spear-shaped centres to the feathers of the back are perhaps a little too definite.

(To be continued.)

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri
V.2/4
590.5
B63J
48,917.

ORCHIDS OF THE BOMBAY PRESIDENCY.

BY

G. A. GAMMIE, F.L.S.

PART XIII.

(Continued from page 174 of this Volume.)

30. Platanthera.

Terrestrial, leafy herb. *Flowers* large, in a *raceme* terminating the leafy stem, *sepals* unequal, free, *petals* simple, forming a hood with the dorsal sepal, *lip* continuous with the *column*, produced at the base into a long *spur*, *blade* 3-lobed, *lateral lobes* broad, pectinate, *midlobe* entire, linear, *column* short, without a foot.

ORCHIDS OF THE BOMBAY PRESIDENCY.

The illustration to this article (*Plate XI—Habenaria Susannæ*) appeared at page 171 of this Volume.

EDITORS.

spreading, *lateral sepals* 1½ by ¾ inch, obliquely subquadrately oblong, obtuse, ascending, *petals* linear acute, 1¼ inch long by ⅛ inch broad, *lip* as long as the sepals, *side lobes* 1½ inch long, truncate, the *outer margins* pectinate to the middle, *midlobe* 1¼ by ¼ inch, *spur* 4 inches long or twice as long as the *ovary*.

Plants start into growth at the onset of the rains and *flowers* appear from August to October.

Distribution.—Abundant throughout the Konkan, North Kanara and Western Ghats. Also in the hill tracts of Eastern Bengal and Assam, Burma, Western Peninsula and the Malay Islands.

Note.—In the Journal of this Society, Vol. X, p. 328, the late Mr. R. M. Dixon has an interesting note on this plant, to the following effect:—The

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

(= about 70 mm. × 47 mm.), respectively, and the smallest 2·28" and 1·67" (=57·9 mm. × 42·5 mm.).

When fresh the great majority of *Sypheotis bengalensis* eggs are decidedly a bright *greenish* olive-green, but very soon after being blown they become somewhat paler, and in a year or two often lose much of their green tint and become more an olive-brown. The gloss, also, which in newly taken eggs is generally highly developed, pales considerably with time, though some retain it for many years and few lose it altogether.

In my article on the breeding of the Florican which appeared in Volume XVII of this Journal, I commented on the close-time needed for the protection of this bird and then said that it was

The Plate of this bird requires [illegible]

male should be deep brown and the upper mandible should have far less yellow or none at all. The plumage of the head and neck is also unusually thick and heavy, though a few birds may have it as dense when just moulted.

The female is excellent, but the spear-shaped centres to the feathers of the back are perhaps a little too definite.

(To be continued.)

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri
V.2/4
590.5
B63J
48,917

ORCHIDS OF THE BOMBAY PRESIDENCY.

BY

G. A. GAMMIE, F.L.S.

PART XIII.

(Continued from page 174 of this Volume.)

30. Platanthera.

Terrestrial, leafy herb. *Flowers* large, in a *raceme* terminating the leafy stem, *sepals* unequal, free, *petals* simple, forming a hood with the dorsal sepal, *lip* continuous with the *column*, produced at the base into a long *spur*, *blade* 3-lobed, *lateral lobes* broad, pectinate, *midlobe* entire, linear, *column* short, without a foot, *anther* broad and large, *cells* slightly divergent, *pollinia* linear, granular, *caudicles* short, *glands* naked, exserted.

1. PLATANTHERA SUSANNÆ, *Lindl.*; *T. Cooke, Fl. of Bombay, II, p. 712; Dalz. and Gibs., p. 269;* Habenaria Susannæ, *Br. Fl. Br. Ind., VI, p. 137.*

Tubers ovoid, globose, rarely lobed, 3 to 4 inches long. *Stems* robust, 2 to 5 feet high, leafy up to the inflorescence. *Leaves* ovate-oblong or oblong-lanceolate, acute or acuminate, imbricate, the upper sheathing, *blades* (becoming smaller upwards and passing into leafy bracts), 2 to 6 inches long by 1 to 2 inches broad. *Bracts* leafy, $2\frac{1}{2}$ to 3 inches long. *Flowers* in 2 to 6 flowered *racemes*, 3 to 4 inches in diameter, white, fragrant, subsessile, *dorsal sepal*, $1\frac{1}{4}$ inch broad and long, broadly rhomboid spreading, *lateral sepals* $1\frac{1}{2}$ by $\frac{3}{4}$ inch, obliquely subquadrately oblong, obtuse, ascending, *petals* linear acute, $1\frac{1}{4}$ inch long by $\frac{1}{8}$ inch broad, *lip* as long as the sepals, *side lobes* $1\frac{1}{2}$ inch long, truncate, the *outer margins* pectinate to the middle, *midlobe* $1\frac{1}{4}$ by $\frac{1}{4}$ inch, *spur* 4 inches long or twice as long as the *ovary*.

Plants start into growth at the onset of the rains and *flowers* appear from August to October.

Distribution.—Abundant throughout the Konkan, North Kanara and Western Ghats. Also in the hill tracts of Eastern Bengal and Assam, Burma, Western Peninsula and the Malay Islands.

Note.—In the Journal of this Society, Vol. X, p. 328, the late Mr. R. M. Dixon has an interesting note on this plant, to the following effect:—The

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

giant Orchis, although commonly reported to be rare and nowhere abundant, is certainly plentiful on the Bhoma Hill at Khandala, from which place the plant does not seem to have been recorded before. After the flowering is over and the fruiting is finished, the plant with the parent root tuber gradually shrivels up and is ultimately withered in December or January, leaving in the ground a healthy, young root-tuber crowned by a well developed bud from which the flower stem shoots up afresh the following season.

The Marathi name of the plant is *Wagh chaora*, meaning the metacarpus of the tiger's foot. Among the Kath-Karis, Thakurs and other Marathi-speaking people living on the Bhor Ghat, the root-tuber of the Giant Orchis is believed to be a sovereign remedy for the cure of blebs or bullæ, specially those occurring on the metacarpus of the palm of the hand. These blebs or bullæ, on account of their supposed resemblance to the raised metacarpus of the tiger's foot are known as *Wagh chaora* in the Deccan. Hence the vernacular name of the plant. There are some persons who believe that the plant is called *Wagh chaora* because the flower looks like the claws or jaws of a tiger.

PLATE XI. The upper part of a plant with the inflorescence. The generic name is given as Habenaria.

(To be continued.)

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA

(INCLUDING THOSE MET WITH IN THE HILL STATIONS OF THE BOMBAY PRESIDENCY).

BY

T. R. BELL, I.F.S.

PART XII.

WITH PLATES I AND J.

(*Continued from page 766 of this Volume.*)

FAMILY—PIERIDÆ.

The members of this family are so subject to variation in the amount of marking on the wings that it is impossible to make a key to the genera without reference to the venation of the wings and other characters which offer difficulties to amateurs.

A. Forewing with all 12 veins present.

a. Male pale blue with black border on upperside, female somewhat like *Danais limniace* in style of marking .. .. *Pareronia*.

b. Male lemon yellow, female sulpher yellow on upperside .. .. *Synchloë*.

B. Forewing with only 10 veins (veins 8 and 9 absent).

a. Of small size: 1″ to 2″; underside hindwing with no red terminal border .. .. *Leptosia*. (Fig. 15.)

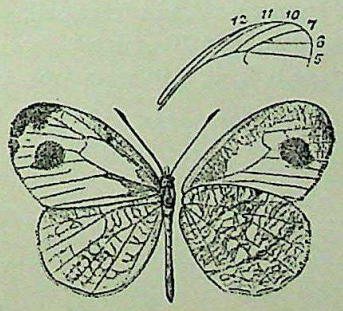


Fig. 15.

b. Larger: 2″·6 to 3″·3; underside with red terminal border to hindwing .. .. *Delias*.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

C. Forewing with 11 veins (only vein 8 absent).

a. Costa serrated. Hindwing underside with orange-red terminal border .. .. .. *Prioneris.* (Fig. 16)

b. Costa not serrated. Hindwing underside with no red terminal border.

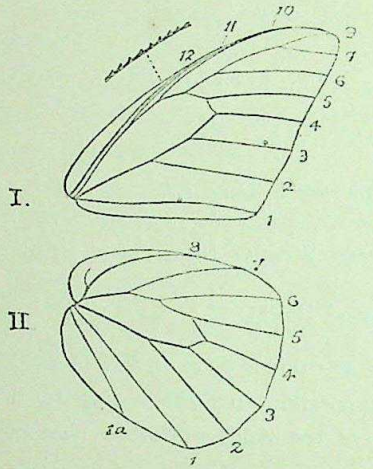


Fig. 16.

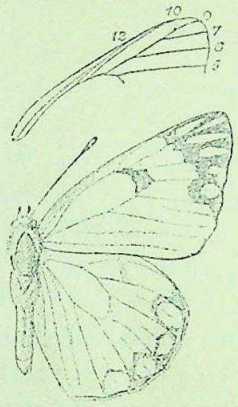


Fig. 17.

a[1]. Forewing with vein 11 anastomosing with vein 12 .. .. *Anaphæis.* (Fig. 17.)

b[1]. Forewing with vein 11 not anastomosing with vein 12 (both veins free).

a[2]. Forewing with vein 6 not stalked with vein 7; size less than 2″·25 .. .. *Colotis.* (Fig. 18.)

b[2]. Forewing with vein 6 not stalked with vein 7; size 3″·75 to 4″ .. .. *Hebomoia.*

c[2]. Forewing with vein 6 stalked with vein 7, *i.e.*, emitted from vein 7, not from cell.

a[3]. Forewing with vein 10 emitted from vein 7, *i.e.*, veins 6, 7, 9, 10 from one common stalk .. .. *Colias.* (Fig. 19.)

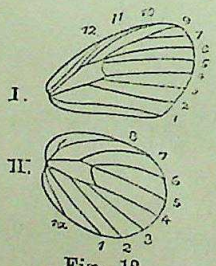


Fig. 18.

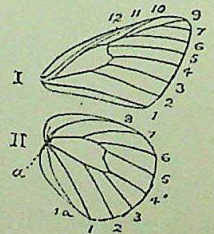


Fig. 19.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

b^3. Forewing with vein 10 emitted from subcostal vein, not stalked with 6, 7, 9.

a^4. Hindwing without a precostal vein .. *Terias*.

b^4. Hindwing with a precostal vein.

a^5. Forewing with vein 11 emitted from the subcostal nervure half-way between base and apex of the cell .. *Catopsilia*. (Fig. 20.)

b^5. Forewing with vein 11 emitted from subcostal nervure nearer apex than base.

a^6. Forewing with vein 9 very short, given off so near the outer margin of wing as to be nearly absent sometimes .. .. *Pieris*. (Fig. 21.)

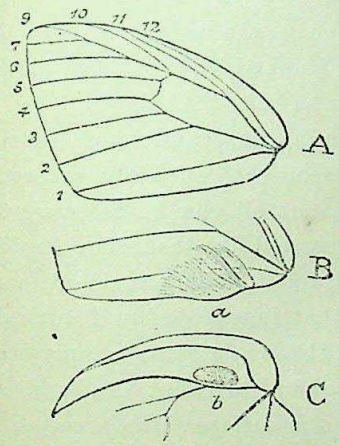


Fig. 20.

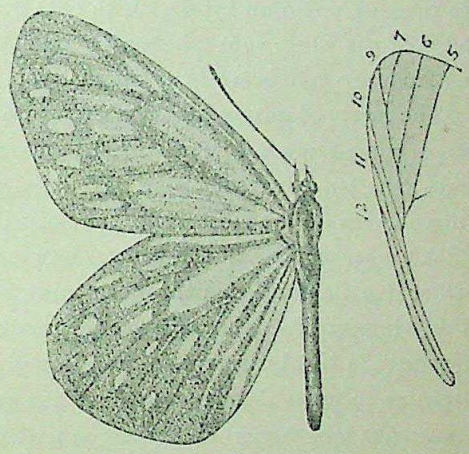


Fig. 21.

b^6. Forewing with vein 9 longer, always given off well before margin of wing.

a^7. Male without specialized tufts of stiff hairs on anal segment at base of clasper ventrally, easily discernible .. .. .. *Appias*. (Fig. 22.)

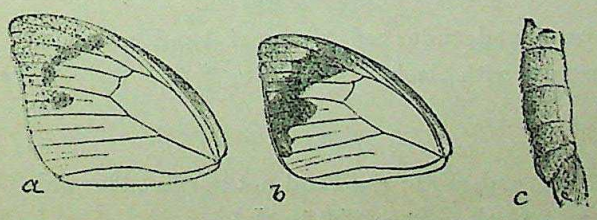


Fig. 22.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

*b*⁷. Male without any such tufts ventrally at base of claspers.

*a*⁸. Forewing upperside white and black without white apical band defined by black and without any orange colour .. *Huphina.* (Pl. I, figs. 61, 61*a*.)

*b*⁸. Forewing upperside white and black but with white or orange subapical band defined by black (mostly orange).. .. *Ixias.* (Pl. I, fig. 62.)

As said before, these vein characters will not be always ascertainable without some slight vexation ; but, with the help of a good lens and a little benzine or spirits of wine, none of them should offer any serious obstacle to running down an insect. The best way to count the veins is round the edge of the wing, vein 2 being a good starting point as it is the first given off from the cell; vein 11 is the last vein given off from the cell.

The larvæ of nearly all the *Pieridæ* are green in colour and of the same type, some few are somewhat hairy, most are somewhat minutely tuberculate ; the pupæ are somewhat varied in shape, but all can be referred to three types at the most: one, the normal, suspended like that of a *Papilio* with a nose-point and the ventral line of wings but little prominent, another like this but with the nose-point somewhat lengthened and curved, the wing outline ventrally very prominent, the whole pupa compressed laterally, a third suspended by tail and body-band also, but the band so tight as to press the pupa against the suspension surface: the nose-point somewhat lengthened and upturned, the dorsum flattened behind thorax and laterally produced into a couple of teeth. The three forms of pupa are characteristic of *Catopsilia, Pareronia* and *Anaphæis* respectively.

Genus Leptosia.

Only one species. Size 1″ to 2″ .. .. *xiphia.* (Pl. I, fig. 58.)

A weak, white, fragile-looking butterfly, found everywhere, even in Sind, keeping to the shady underwood. It has a large black spot on outer area of forewing. Larva and pupa normal ; foodplant *Capers.*

Genus Delias.

A. Hindwing underside: red marginal band margined inwardly with black. Size: 3″ to 3″·30 .. .. *eucharis.* (Pl. I, fig. 59 ♂, 59*a* ♀.)

B. Hindwing underside: red band not margined inwardly with black. Size: 2″·6 to 3″·3 .. .. .. *hierta.*

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

These insects are weak fliers and are very common; they are easily distinguishable by the red marginal band on underside of hindwing. The larvæ of *eucharis* are gregarious, feed on *mistletoe* and are greasy looking, olive-brown in colour with longish white hairs, 6 or so to each segment. Pupa oily greenish yellow with black markings.

Genus PRIONERIS.

Only one species. Size: 3″·40 to 3″·50 .. .. .. *sita.*

Certainly not a Plains butterfly; confined to the hills altogether; but has been mentioned here as it is so extraordinarily like *Delias*. It is, however, a very strong flier. Larva feeds on *Capers*.

Genus ANAPHÆIS.

Only one species. Size: 1″·75 to 2″·5 .. .. .. *mesentina.* (Pl. I, fig. 60.)

Altogether a butterfly of the Plains and one of the commonest. Larvæ gregarious, green, with purplish bands on each side; somewhat hairy. Pupa abnormal as stated above. Foodplant *Capers.*

Genus PIERIS.

A. Hindwing underside: markings green. Size: 1″·6 to 2″ .. .. *glauconome.*

B. Hindwing underside: not green.

a. Forewing upperside: inner margin of apical black area evenly curved. Size: 2″·5 to 3″ .. .. *brassicæ.*

b. Forewing upperside: inner margin of black apical area sinuous or scalloped. Size: 1″·6 to 2″·3 .. *canidia.*

This genus is not of the Plains at all; it is confined to the higher hills in the Himalayas and Nilgiris (*canidia*). *Glauconome* has been taken at Karachi in Sind several times, does not occur further south seemingly, but is plentiful in the hills of the North-West. *Brassicæ* is recorded from Lucknow and Umballa in North India, but only as a straggler; it is a Himalayan butterfly; also European. *Canidia* is said to have been taken in Lucknow which is the only record of its appearance in the plain country.

The larvæ of the genus are quite normal, the pupæ are of the type of those of *Anaphæis*. The foodplants are *Cruciferæ*: cabbage and such like plants.

The character of *a* and *b* is not well marked in the females of the species concerned.

Genus SYNCHLOË.

Only one species. Size: 1″·3 to 1″·66 .. .. .. *lucilla.*

Genus HUPHINA.

Only one species. Size: 2″ to 3″ .. .. *nerissa.* (Pl. I. figs. 61 ♂, 61*a* ♀.)

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

A very common insect, found almost everywhere and a fast, strong flier; somewhat variable according to season and locality.

Larva normal, green; pupa of the *Anaphæis* type. Foodplant *Capers*.

Genus Ixias.

A. Upperside: ground-colour clear gamboge-yellow. Size: 1″·70 to 2″·50 .. .. *pyrene*. (Pl. J. figs. 65 ♂, 65*a* ♀♀.)

B. Upperside: ground-colour white.

a. Forewing upperside: preapical orange patch extended into apex of cell. Size: 2″·1 to 2″·6 .. *marianne*. (Pl. J. fig. 62.)

b. Forewing upperside: preapical orange patch not extended into cell. Size: 2″· to 2″·2 .. .. *nola*.

These are "Orange-tips." *Nola* is probably only a variety or local race of *marianne* as the character of extension of the orange patch is not a good one; it is only found at Mahableshwar on the Western Ghats. The ground-colour of *pyrene* female may be almost white, though never pure white, and may have no orange patch though the black border defining that patch is always present.

Larva green; pupa of the *Anaphæis* type. Foodplant *Capers*.

Genus Appias.

This is an extremely difficult group to disentangle as the individuals vary so much with the season and locality in the amount of markings on the wings; some specimens, indeed, of one species which is normally white may be suffused strongly on the underside with yellow or orange. The forewing of the male is nearly always rather narrow and pointed.

A. Forewing: veins 5 and 7 approximate at bases and, therefore, the top discocellular vein missing; the upper discocellular (veinlet uniting veins 5 and 6) less than half the length of the lower discocellular veinlet (uniting veins 4 and 5).

a. Male forewing underside: discal black band narrow; hindwing not richly coloured underneath in wet-season form. Size: 2″ to 3″ .. .. .. *indra*.

b. Male underside forewing: discal black band broad; hindwing underneath richly coloured in wet-season form. Size: 2″·3 to 2″·75 .. .. *narendre*.

B. Forewing: veins 5 and 7 approximate at bases; top discocellular more than half length of lower discocellular.

a. Upperside forewing: outer black margin or area not produced inwardly in interspace 3.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

a^1. Hindwing underside: with terminal black band; male underside forewing: a prominent white or yellow subapical spot. Size: 2″·5 to 3″ .. *hippo.*

b^1. Hindwing underside: with no terminal band and, in the male forewing underside: no apical white or yellow spot.

a^2. Male underside: pure white in wet-season form, tinged with ochraceous in dry-season form.

a^3. Male underside hindwing: immaculate at all seasons. Size: 2″·1 to 2″·6 .. .. *libythea.*

b^3. Male underside hindwing: veins more or less broadly black, white only in extreme dry-season form. Size: 2″·1 to 2″·7 .. *zelmira.*

b^2. Male underside hindwing: yellow or ochraceous at all seasons. Size: 2″·38 to 2″·94 .. *albina.*

b. Upperside forewing in the male: outer black margin produced inwardly into interspace 3 (except in dry-season form of *leis*).

a^1. Male underside forewing: oblique, curved black band on outer half terminated on vein 2, sometimes reduced to a mere black spot in interspace 3. Size: 1″·9 to 2″·6. .. .. *leis.*

b^1. Male underside forewing: oblique, curved black band on outer half extended to tornal angle or altogether absent. Size: 2″·55 to 3″ .. *wardi.*

The larvæ of all these are very like each other, fairly normal in aspect; the pupæ are of the *Anaphæis* type. Foodplant *Capers.*

Genus CATOPSILIA.

A. Underside: without irroration of transverse reddish-brown striæ. Size: 1″·8 to 3″·4 .. .. .. *crocale.* (Pl. L., figs. 72 ♂, 72*a* ♀♀ of form *catilla*; 73 ♂, 73*ab* ♀♀ of *crocale.*)

B? Underside: with such irroration. Size: 2″ to 2″·75. *pyranthe.* (Pl. J. figs. 64 ♂, 64*a* ♀.)

The first species is very liable to variation in the amount of black on the upperside in the females; the males are very constant.

Very common butterflies; fast fliers.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Larvæ and pupæ altogether normal. Foodplants: *Leguminoseæ*; nearly confined to the genus *Cassia*.

Genus Colias.

Only one species, said to have been obtained at Lucknow.

Size: 2″ to 2″·5 .. .. *fieldii*.

A Himalayan species, visiting the Plains only as a straggler.

Genus Terias.

A. Forewing underside: cell unmarked.

a. Male with secondary sexual characters on both wings; both sexes with dark line on discocellulars of underside of forewing.

*a*¹. Forewing: apex rounded. Size: 1″·4 to 1″·7 .. *venata*. (Pl. K., fig. 70, 70*a*, 70*b*, 70c.)

*b*¹. Forewing: apex acute. Size 1″·4 to 1″·9 .. *læta*. (Pl. K., fig. 69, 69*a*.)

Venata has the black margin of forewing reaching tornus, *læta* has it stopping before it.

b. Male with no secondary sexual characters; both sexes with two dots on discocellulars on underside of forewing. Size: 1″·25 to 1″·75 .. .. *libythea*.

B. Forewing underside: two marks in basal half of cell. Size: 1″·60 to 2″·20 .. .. *hecabe*. (Pl. K., figs. 71,71 *a*, *b*, *c*, all forms.)

C. Forewing underside: three marks in cell. Size: 1″·60 to 2″·10.. .. .. *silhetana*.

Venata is often difficult to distinguish from *libythea* as the marks may be obsolete; at least the females are: for the males can be told at once by presence or absence of sex-marks; however *venata* is often powdered with blackish scales on upperside. *Læta* is unmistakeable from the shape of the wing and the bar-marking, as also the colour on the underside of hind-wing.

The larvæ and pupæ are normal, *i.e.*, this is known of all except *T. læta* which has never been bred; and this species is remarkable as being very plentiful in the dry season, nearly completely absent during the monsoon months. Foodplants: *Leguminoseæ*; genus *Cassia*, &c.

All the species are some shade of sulphur-yellow with black borders to the wings.

Genus Colotis.

A. Upperside: ground-colour salmon-pink; female sometimes with ground-colour white.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

a. Upperside: sometimes white in the female. Terminal black band on hindwing narrow with a more or less obsolescent series of spots of the same tint as ground-colour so arranged as to break up the inner edge of band. Size: 1″·5 to 2″ .. *amata.* (Pl. J., fig. 68.)

b. Upperside: always salmon-pink. Terminal black band on hindwing broad and immaculate. Size: 1″·5 to 2″ .. .. *protractus.*

B. Upperside forewing: salmon-pink, of hindwing white, of female sometimes both wings white. Terminal black band of hindwing broad. Size: 1″·5 to 1″·8. .. .. *phisadia.*

This species is like *protractus* except that the spots on the apical band of forewing are of the ground-colour and not suffused with grey as in that species.

C. Upperside: ground-colour of both wings orange-pink; female sometimes with ground-colour white or white suffused with salmon-buff.

a. Upperside forewing: four or five spots of ground-colour enclosed in terminal black border. Size: 1·″8 to 2″·25 .. .. *fausta.*

b. Upperside forewing: never more than three spots included in the black border. Size: 1″·8 to 2″·25 .. .. *tripuncta.*

Fausta is found in Sind, Panjab, Rajputana, Bombay; *tripuncta* in Sind, Bombay, Poona, Nilgiris, Bengal, Orissa, Ganjam.

D. Upperside: ground-colour white.

a. Upperside forewing: no orange or carmine markings, a broad, black, terminal immaculate band. Size: 1″·5 to 2″ .. .. *vestalis.*

b. Upperside forewing: orange or carmine apical patch present.

a^1. Upperside forewing: apical patch orange.

a^2. Forewing upperside: the orange patch not bordered with black on inner side. Size: 1″·4 to 2″ .. .. *eucharis.*

b^2. Forewing upperside: orange patch bordered on inner side with black. Size: 1″·2 to 1″·75 *etrida.* (Pl. J., figs. 67, ♂ 67*a* ♀.)

b^1. Upperside forewing: apical patch crimson. Size: 1″·5 to 1″·75 .. .. *danaë.*

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

These last three are the small "Orange-tips." None of the genus are found in jungle countries nor in the hills proper. They are all butterflies of the Plains, though *amata* occurs in the Konkan.

The larvæ of all that have been bred are normal as well as the pupæ; except the pupa of *C. eucharis* which has the ventral line of wings very convex in the manner of *Pareronia*. *C. amata, protractus, phisadia* and *vestalis* are divided from the others by the fact that they feed upon *Salvadora persica* of the Family *Salvadoraceæ*; the others feed upon *Capparis*. *Salvadora persica* is the "Mustard Tree" of Scripture. There is another species also, *Salvadora oleoides*, in Sind upon which larvæ are occasionally found.

Genus HEBOMOIA.

Only one species. Size: 3″·75 to 4″ .. .. .. *glaucippe*. (Pl. J., figs. 66 ♂, 66*a* ♀.)

This is the Large Orange-tip, a very powerful, fast flying insect, not uncommon along the Western Ghats and in the Konkan.

The larva is not quite normal, green in colour; the pupa is of normal shape, also green. Foodplant: *Capers*, especially *Capparis moonii* and *Cratæva religiosa*.

Genus PARERONIA.

A. Male: forewing upperside: terminal black border narrow, traversed by a more or less complete subterminal series of bluish-white spots; female is somewhat like *Danais aglea* and has sometimes the base of the wings yellow; the eyes of both sexes are generally green. Size: 2″·75 to 3″·5 .. .. *hippia*. (Pl. J., figs. 63 ♂, 63*a* ♀.)

B. Male: forewing upperside: terminal black border broad with no light spots or only a slight trace or one or two, female like the last but never with yellow at base of wings. Size: 3″ to 3″·4.. .. *pingasa*.

Hippia is common and really the only one that occurs in the Plains; the other may be found along the borders, more probably in the Hill Stations of Matheran and Mahableshwar in the Western Ghats. It is generally possible to distinguish *hippia* from *pingasa* by the more or less nacreous (like mother-of-pearl) lustre of the underside in the former, especially on the hindwing, as well as by its lighter blue colour.

The larvæ are nearly normal, the pupæ are much compressed laterally, have long, curved beaks and the ventral wing-outline very prominent. The foodplants are *Capers*.

The *Pieridæ* as a family are characterized by "six well developed legs,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

the same in both sexes, no pad on front tibiæ. Claws bifid or toothed; an empodium." The members of it are generally popularly known as "whites" because, in the vast majority of the species of the world, the prevailing colour is white. Nearly all species are marked with black to an extent varying generally with the time of year; in the tropics this means with the period of young shoots rich in moisture and juices or the time when such is not the case.

There are upwards of 1,000 species in the world, Colonel Bingham enumerates 90 as occurring in British India of which number some 42 will be mentioned here. The family is represented in all countries and in all climates from 18,000 feet elevation to sea-level according to species and genera, in the driest regions as well as in districts possessing the heaviest rainfall. More particular information will be given for each genus and species here treated of in its proper place.

Home representatives of the family are the Cabbage Whites, the Clouded Yellows, the Orange-tips, the Brimstone, Bath White, &c. Some of the genera are numerous in species and the latter are often extremely numerous in individuals in India as well as at home, some of the species of *Catopsilia*, *Appias*, *Terias*, *Colotis* extremely so in India. Like the Cabbage White at home *Catopsilia crocale* and *C. pyranthe* as well as *Appias libythea* and *hippo* are veritable pests in certain years, defoliating every foodplant in certain localities to such an extent that millions of the caterpillars die of starvation. The phenomenon is perhaps not as noticeable as at home for the very sufficient reason that the results of a visitation do not affect people in the same way because the trees that the insects feed upon are not of any economic importance to human beings as food. Nonetheless, however, is it a wonderful sight to see millions of larvæ covering the trunks of huge trees, descending from the leafless branches in search of the wherewithal to further their growth. In such numbers they come that, literally, not an inch of bark is visible; often they are packed three deep one on top of the other. A vast number must, of course, die for the odds are against any of this host finding a new tree to ascend; and, even if they did, the probabilities of their finding any leaves on it would be very slight indeed. In such seasons of prolific broods of larvæ the imagines or perfect insects appear in such numbers that, when disturbed from their resting places beneath the leaves in the jungles, they nearly darken the air in yellow clouds (*Catopsilia*). It is easily conceivable that, were these butterflies to remain stationary in any single locality, there would be but small chance for their progeny. They seem to instinctively know this for they migrate in countless numbers to other districts. These migrations have been noticed by travellers in many parts of the world. All fly in one direction to start with and Colonel Bingham says that he has noticed that the flight is against the wind. He remarks that one of the

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

consequences of the dispersal of individuals thus effected leads to the breaking down of distinctions between local races thus preventing variation in the insects of widely separated districts. These migrating *Pieridæ* are all very strong fliers and some individuals would doubtless go far from their place of origin ; in the course of a few years, probably hundreds of miles.

The prevailing colouring is, as already stated, white, often suffused with some shade of yellow above as well as below, the upperside often with black bordering which is subject to variation in extent and intensity according to the season, sometimes, indeed, affecting very nearly the whole surface in the so-called wet-season broods where the dry-season individuals are lightly marked. In certain genera (*Colotis*) we get species that are salmon-coloured, in others (*Colotis, Hebomoia, Ixias*) the apex of the forewing in some species has an orange or yellow or carmine patch; in *Prioneris* and *Delias* the underside of the hindwing may have a broad red terminal border or basal red spots ; *Pareronia* has in the male some shade of light blue with black veining and border on the upperside ; in *Appias* the underside in certain species is subject to suffusion with deep yellow while *Terias* is always some shade of yellow above and below. Fresh young shoots that appear in the hot weather in India produce large specimens with extensive, intense black markings while the comparatively hard, dry leaves of the cold weather result in smaller and much lighter insects. Now, in the generality of cases, dry, hard leaves mean slow feeding, consequently slow larval growth and large, light specimens; new, tender leaves have the effect of allowing quicker growth, producing smaller, darker individuals. In the *Pieridæ*, seemingly, the rate of growth of the larva is more or less constant whatever the quality of the food available and, therfore, the more food and the easier it is to assimilate, the larger the resulting imagine is. All the larvæ of the family are voracious eaters and feed upon soft-leafed trees and bushes or upon herbaceous plants the young shoots of which are fast growing and very juicy ; the soft leaves admit of the quantity of food being always sufficiently easily assimilable to produce the normal growth and the great softness of the new shoots gives an extra impetus to increasing the size, while their extreme juiciness produces the exuberance of black pigment which is so remarkable in the family. The colouration of the wings is characteristic at all seasons and its style never varies though the extent may ; even on the undersides the style is constant and there is nothing ever to be found of the curious seasonal dimorphism existing in some nympaline and satyrine butterflies. The shapes of the wings are the same at all seasons, also though, perhaps, *Terias læta* has the apex of the forewing more produced in the cold weather.

The larger whites are very strong, fast fliers and progress in the skipping style, in successive undulations, *Hebomoia, Catopsilia* ; *Delias*, however

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

though large, has weak wings and flutters straight ahead. Most of the lesser species fly straight along in the usual way except *Leptosia* which is peculiar in having a slow sailing, deliberate flight of its own. They rest on the undersides of leaves with the wings closed over their backs; *Hebomoia* often rests on the ground with the forewings sunk down between the hinder ones so as to show only the darker parts and is then very difficult to see. They are all fond of the sunlight with the exception of *Pareronia* and *Leptosia* which are insects of the jungles while the others affect more open ground. *Catopsilia* and *Prioneris* often fly high over the tree tops while most of the others keep close to the ground; *Hebomoia* is also often to be seen high up in the air. They all are fond of flowers and *Catopsilia*, *Appias*, *Prioneris*, *Terias* come to moist spots in nallas and on roads in immense numbers during the hot weather.

The egg is cylindrical, narrowed towards the top but very shortly, generally twice as high as broad, with longitudinal ridges some of which join before they reach the top, their ends forming a circle of little teeth or a crown round the micropile, the surface generally finely transverse-lined. The colour is white, generally changing to yellow or orange, sometimes very light with red blotches or rings. They are mostly laid singly on a young shoot, on the edge of a leaf, generally on the upper or lower surface. *Colotis amata* however lays them in batches of 20 to 40, sometimes less, on the undersides of leaves and *Anaphæis mesentina* likewise though, as this insect generally affects *Capparis aphylla* as the foodplant of the larvæ, they are laid on the twigs, there being, as a rule, no leaves.

The larvæ are always without processes of any sort and are generally some shade of green with transverse depressed fine lines, mostly 7 to each segment, each interval between two lines with a row of black or white tubercles, each with a hair growing out of the top; some have a heavy fringe of fine, longish hairs along the sides in the subspiracular region but this is not very common. The head is always round, the anal segment sometimes more or less bifid, the general shape of the body being cylindrical, very slightly thickest in the middle. *Anaphæis mesentina* has a coloured larva with a broad ochreous dorsal band and brown-purple sides. Most of the caterpillars are spotted indistinctly under the skin and have a dorsal or spiracular white band or line, or both. They are not very active, some of them drop from the leaf when disturbed; the great majority rest in the middle of the upperside of a leaf, lying along the midrib on a bed of silk and generally full stretched though some occasionally sit with the front part raised, others with the hinder end in the air. As a rule they eject a sort of green liquid from the mouth when disturbed but do not otherwise possess any visible way of defending themselves. A few turn pink before pupating.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

The pupa is of two types, one somewhat resembling a smooth *Papilio chrysalis* with a frontal beak and ventrally bulged wings; the other quite different, having the dorsal middle segments produced horizontally outwards in triangular sharp teeth, the dorsal line of the thorax angled and the head produced into a generally upwards-curved snout. They all have the tail and body-band fixture of the *Papilionidæ*; the former suspending themselves as in that family, the latter angled ones often lying horizontally on the top of a leaf and closely pressed against it, *i.e.*, with a very short body-band. All wriggle when touched, the motion being a side to side one from the segments 9, 10, 11; the junctions of segments 8-9, 9-10, 10-11, being so formed as to permit of this which, by the way, is common to all lepidopterous pupæ. Sometimes this wriggling is accompanied by a slight, dull knocking noise.

The larvæ all eat voraciously, grow fast and the pupal stage is never prolonged. They are often much parisitised by ichneumons and flies, the most unfortunate in this respect being various species of *Terias* and *Colotis*.

The caterpillars offer so few points of difference in shape and colour that a classification of the genera according to them would be rather difficult as the little pattern that exists may be quite absent in species that normally have it quite strongly developed; the size and number of the tubercles is also liable to variation. Another objection is, and it is perhaps the chief one, there is not very much material to go on for there are many of the larval and pupal stages not yet worked out. One large classification on the pupæ is possible, as for example:

Smooth, normal pupæ, suspending themselves like the *Papilionidæ:* Genera *Leptosia, Catopsilia, Ixias, Hebomoia, Terias, Colotis, Pareronia.*

Angulated pupæ, with tail-fixing and close body-band, formed often on the upperside of a leaf or other horizontal position: *Delias, Prioneris, Anaphæis, Appias, Huphina, Colias, Pieris.*

The first group might be further subdivided into two by the shape as follows:—

Normal pupæ with slight ventral wing-bulge and short snout; Genera *Leptosia, Catopsilia, Hebomoia, Terias* and *Colotis* with the exception of *Colotis eucharis.*

Abnormal pupæ with very accentuated ventral wing-bulge, the body laterally compressed and a long curved snout: Genera *Ixias, Pareronia* and *Colotis eucharis.*

Here again, in the first sub-group *Catopsilia* and *Hebomoia* could easily be separated from *Leptosia-Terias-Colotis* and it is possible to separate *Catopsilia* from *Hebomoia* by the shape of the larvæ and their colouration as:

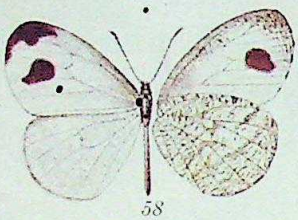
Larva distinctly flanged on the spiracular line, glaucous green in colour,

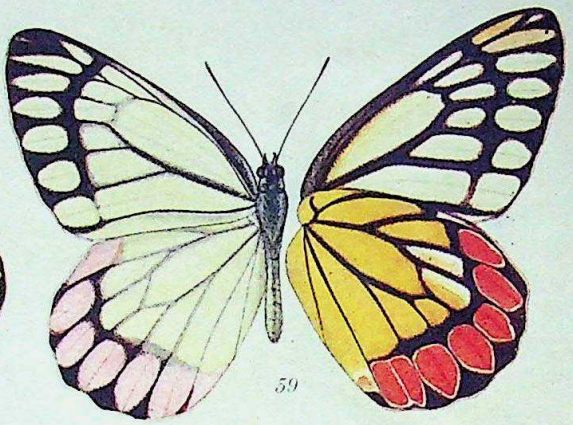
CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

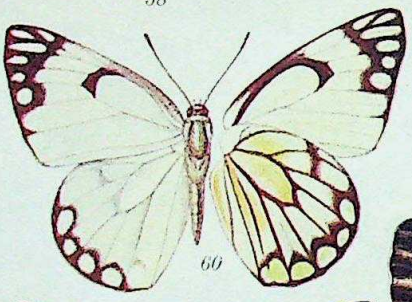
Digitized by Arya Samaj Foundation Chennai and eGangotri

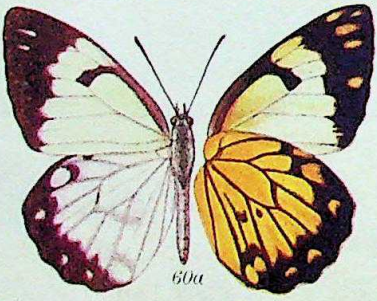
CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

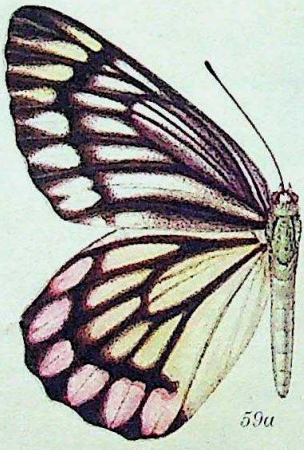
Digitized by Arya Samaj Foundation Chennai and eGangotri


58

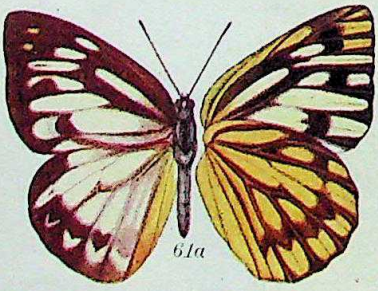

59

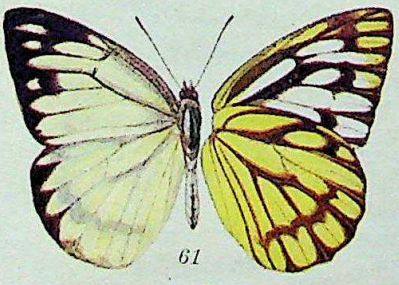

60

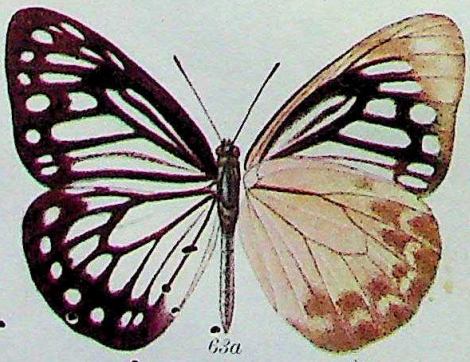

60a

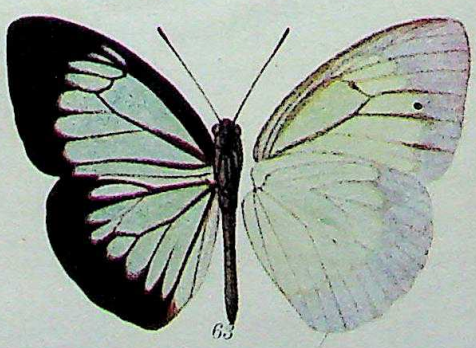

59a

62


61a


61


63a


63

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Horace Knight, del. Hentschel-Colourtype.

Digitized by Arya Samaj Foundation Chennai and eGangotri

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA.

Explanation of Plate I,

Fig. 58. Leptosia xyphia, ♂

,, 59. Delias eucharis, ♂; 59 a, ♀

,, 60. Anaphæis mesentina, ♂; 60 a, ♀

,, 61. Huphina nerissa, ♂; 61 a, ♀

,, 62. Ixias marianne, ♂

,, 63. Pereronia hippia, ♂

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

swollen about segments 3, 4 with a spiracular line of irridescent tubercles: *Hebomoia*.

Larva normally cylindrical all along, green or yellowish green, a white spiracular band and transverse rows of black tubercles to each segment, those immediately above the spiracular band generally more or less strongly developed forming a black supraspiracular band: *Catopsilia*.

The larva again of *Leptosia* might be separated off from *Terias-Colotis* by the fact that it is smaller and slighter than them; but such classification is useless.

The second group having angulated *chrysalides* may be subdivided to a certain extent as follows:

Larva not green: *Anaphœis, Delias*. And again these may be known:
Larva light brown: *Delias*.

Larva ochreous and purplish brown in longitudinal bands: *Anaphœis*.

Larva green of some shade: *Prioneris, Appias, Huphina, Colias, Pieris* These being insufficiently known it is impossible to further distinguish them at present.

The food-plants of the members of the family are various though all (leaving out *Pieris, Colias, Synchloë*) belong to the *Leguminosæ, Capparideæ, Salvadoraceæ*: *Loranthaceæ, Euphorbiaceæ*, as follows:

Leguminoseæ: Terias, Catopsilia.

Capparideæ: Leptosia, Pareronia, Prioneris, Ixias, Anaphœis, Huphina, Colotis, Appias (except *Appias wardi*).

Loranthaceæ; Delias.

Euphorbiaceæ: Appias wardi.

Salvadoraceæ: Colotis.

Most of the larvæ that feed upon Capers will feed upon any Caper; *Terias* will also feed upon nearly any leguminous plant; *Catopsilia* is nearly confined to the genus *Cassia* but will feed upon most of the species of that genus.

87. Leptosia xiphia.—*Upperside*: white; base of wings very slightly powdered with minute black scales. Forewing: costa speckled obscurely with black, apex black, the inner margin of this inwardly angulate; a very large, somewhat pear-shaped, postdiscal spot also black. Hindwing: white, uniform; in most specimens an obscure, extremely slender, terminal black line. *Underside*: white, costal margin; and apex of forewing broadly, and the whole surface of the hindwing irrorated with transverse, very slender, greenish strigœ and minute dots; these on the hindwing have a tendency to form subbasal, medial and discal, obliquely transverse, obscure bands; forewing: the postdiscal black spot as on the upperside; terminal margins of both fore and hindwings with minute, black, short, transverse, slender lines at the apices of the veins, that have a tendency to coalesce and form a terminal continuous line as on the upperside. Antennæ dark brown

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

spotted with white, head slightly brownish, thorax and abdomen white. Female similar, the black markings on the upper side of the fore wing on the whole slightly broader, but not invariably so.

Egg.—Cylindrical, slightly swollen in middle, becoming abruptly narrow at top; 13 longitudinal ridges of triangular section of which only six reach the top where their ends, as minute teeth, surround the flat end. Colour blue. H: 1·2mm.; B: 0·5mm.

Larva.—Head round, with very prominent, shiny, black eyes, covered with black, short, stiff, semi-appressed bristles; smaller than segment 2; colour green. Body cylindrical, broadest at segments 4, 5 and 6, thinning off suddenly at segment 13. Anal segment narrow, square at end with a colourless, curved, straight hair from each corner pointing backwards, rising from a cylindrical, white tubercle. The whole length of the body is lined transversly by depressed lines at equal distances from each other; between these lines are rows of black, erect, short bristles surrounded at their bases by a circular, green mark; there is a single row between each two lines; interspersed among these bristles are a few white, cylindrical tubercles bearing each an erect, white, longish hair generally carrying at its tip a drop of amber-coloured, transparent liquid; these long hairs are most numerous on segments 2, 12 and 13. Ventrum also haired at sides. Spiracles nearly oval, very small and difficult to distinguish. Colour grey-green with an indistinct, supraspiracular, dark line, below which is a whitish spiracular line; a darkish dorsal line. L.: 17mm; B: 2·5mm.

Pupa.—Head small, eyes nearly hidden by the broad base of the short, conical beak. The pupa is of the type of *Terias hecabe*. It is slight and delicate-looking. Segment 2 broad and waved as to hinder and front margins, flattish on top. Thorax short, humped, very slightly carinated, as well as segment 2, dorsally. Sides from shoulders to segment 8 parallel. Part made up of head and segment 2 parallel-sided and narrower than shoulders. Section of abdomen from segment 9 to end circular. Constriction at segment laterally wide and slight, dorsally ordinary. Cremaster stout, square, with a dorsal depression near hinder margin. Apex of thoracic (ventral) expansion of wing cases, which is parabolic, opposite segment 7. Spiracles oval, light ordinary in size. No spiracle of segment 2 visible. Surface glabrous, very minutely transversely striated, shiny. Colour very transparent green, often suffused with pink; a dorsal and lateral brown line the whole length of pupa, covered with pink-brown spots obsolescently and sparsely; a lateral row of black spots on segments 3 to 12, those on segment 5 exuding a black or white liquid which dries like gum; there is one spot laterally to each segment; beak yellow with a ring of 7 black spots half way up. L: 13·6 mm.; B: 3 mm. H. at apex of wing-bulge: 4·4mm.

Habits.—The egg is laid on the underside of a leaf near the

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

ground, generally on a young leaf; the larva lives on the underside as a very general rule, but may be found on the upperside also; it has the slow-moving habits of the larvæ of the family and does not wander far to pupate. The pupa is attached to the underside of a leaf, the tail-pad is fairly thick and the attachment therefore strong, the body band is fairly loose. The growth of the larva is fast and the duration of the pupal stage about a week. The butterfly is the weakest flier of the whole family; a flimsy little thing that never rises more than a foot or so from the ground and may at all times be found in the undergrowth, fluttering along weakly, with the wings held horizontally, open for longer intervals than is usual with any other member. Notwithstanding its small size, it is a conspicuous little insect when flying because of its pure white colour, with the single large black spot; when at rest it closes the wings, sinks the upper into the hindwings and becomes nearly invisible from the protective marking of greenish strigæ and lines which cover the underparts that remain exposed; it sits generally on the underside of a leaf or on a thin perpendicular plant-stem or dead stick. The food-plants of its larva are Capers of probably all species except the absolutely herbaceous ones. It has been actually bred upon *Capparis heyeana* and *Cratœva religiosa* in Kanara. The distribution according to Colonel Bingham is "the lower Ranges of the Himalayas from Mussoorie to Sikkim; Central, Western and Southern India *but not in the desert tracts*; Ceylon; Assam; Burma and Tenasserim; extending to China and the Malayan Subregion." What is meant here by the "desert tract" is not exactly known. If Sind is included in the term, then the statement is wrong (the italics are not Colonel Bingham's) for the insect has been seen often in the neighbourhood of Karachi and in other parts of that country; it is not uncommon in Gadag and Bijapur of the Bombay Presidency. The probability is that it exists anywhere there are opportunities for the food-plants to grow. The little butterfly is not subject to much seasonal variation; it only affects the tone of the green on the underside and, to a very limited extent, the size of the black markings on the upperside as also their intensity.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

88. Delias hierta.—male and female closely resemble *D. eucharis*, but can be distinguished as follows :—male *upperside* : fore wing : the black margins to the veins more diffuse ; the transverse, postdiscal fascia diffuse, ill-defined, oblique, not parallel to termen in its lower portion but terminated at apex of vein 2 ; the apical portion of the wing beyond the fascia more or less so thickly shaded with black scales as to leave the white lanceolate spaces between the veins (so prominent in *eucharis*) ill-defined and obscure. Hind wing white, the black venation and terminal narrows, black border as well as the subterminal vermilion-red spots between the veins on the underside show through by transparency. *Underside* : fore wing as in *eucharis*, but the back margins to the veins much broader and the postdiscal, transverse fascia as on the upperside, oblique but broader. Hind wing differs from that of *eucharis* in the much deeper chrome-yellow tint of the ground-colour, the postdiscal, black, curved fascia that in *eucharis* separates the yellow from the subterminal vermilion-red spots entirely wanting, the red spots themselves pointed inwardly, not subcordate, they conspicuously increase in size posteriorly. Antennæ, head, thorax and abdomen similar to those of *eucharis*. Female differs from the female of *eucharis* on the upperside by the very much darker shading, especially on the forewing and by the postdiscal, transverse band which is as in the male oblique but broader. Hind wing also more darkly shaded, the postdiscal, transverse, curved, black band entirely absent. *Underside* as in the male but darker, the forewing especially more thickly shaded with black scaling, the preapical interspaces tinged with yellow. Antennæ, thorax and abdomen similar to those in *eucharis*. Expanse : 78-84mm.

Habits.—As far as is known the species has not been bred. Specimens from the Himalayas are said to be paler than those from Burma and have the yellow on hind wing on the underside often restricted to the base and to the posterior half of wing. There are two very nearly allied races or species called *D. metarete* and *ethira* from Southern Tenasserim and Madras ; Orissa ; Lower Bengal, respectively. *D. hierta* exists in the Himalayas from Kumaon to Sikhim in the low, hot valleys ; Bengal ; Calcutta (*de Nicéville*) ; Assam ; Burma to Northern Tenasserim ; extending to Siam. The larva of another species from Nepal, Sikhim, Assam, Burma, Tenasserim, extending to the Malay Peninsula and Borneo and, on the east, to South China, namely, *D. aglaia*, is, from the description, probably very similar to that of our *D. eucharis* ; but is said to feed upon *Nauclea rotundifolia* a species belonging to the family *Rubiaceæ*.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

89. Delias eucharis. *Upperside*: white. Fore wing: the veins broadly black, this colour broadened triangularly at the termination of the veins, costal margin narrowly black; a broad, black, postdiscal, transverse band from costa to dorsum, sloped obliquely outwards from costa to vein 4, thence parallel to termen. Hind wing with the veins similar but for three-fourths of their length much more narrowly black; a postdiscal, transverse, black band as on the fore wing but much narrower, curved and extended only between veins 2 and 6; beyond this the veins are more broadly black and this colour, as on the fore wing, broadens out triangularly at the temination of the veins; the interspaces beyond the postdiscal, black band pink, due to the vermilion coloration of the underside showing through. *Underside*: fore wing similar but the black edging to the veins much broader, the upper two interspaces beyond the postdiscal, transverse band tinged with yellow. Hind wing: ground-colour bright yellow, the veins and transverse, postdiscal band as on the upperside but much more broadly black, the latter extended from the costa to vein 2; the interspaces between the veins beyond the postdiscal fascia with a series of broadly lanceolate or cone-shaped, vermilion-red spots, each spot very narrowly edged with white; the basal portion of interspace 6 white, in contrast to the bright yellow of the ground-colour. Antennæ black; head, thorax and abdomen white, the apical joint of the palpi black; the head and thorax with a mixture of black hairs that gives these parts a grey-blue appearance. *Upper* and *undersides* similar to those in the female, but the black edging to the veins and the postdiscal, transverse bands on both fore and hind wings very much broader. Expanse: 80-85mm.

Egg.—Light yellow in colour; white immediately after laying; very shiny, of an ordinary size, ovoid in shape, truncated at bottom, standing erect, smooth with indications of course longitudinal striation.

Larva.—(Pl. 1, figure 17.) Head round, flattish, black, with a white line at base of jaws and mandibles; antennæ white, black tipped. Body cylindrical; 2nd segment slightly smaller than head; anal segment ends round and is short. The colour of the body is a greasy, greenish-yellow brown. The front half of the 2nd segment is white, with a black patch dorsally behind the white part; there is a lateral white line on segments 2 and 3. The head is sparsely covered with long, white hairs, those near the top of face being longer than the others. The 2nd segment has a collar of 6 longish white hairs. There is a subdorsal row of long, white, erect hairs, one to each segment proceeding each from a white tubercle; there is also a dorsolateral and supraspiracular row of white hairs, each hair proceeding from a white tubercle. The body is besides covered with small white tubercles, each surmounted by a small erect, white hair. Spiracles smallish, oval, light. Ventrum yellow. L: 40mm; B: 6mm.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Pupa.—(Pl. 1, figure 17.) Head round in front surmounted on its vertex by two subdorsal cylindrical, round-topped, short tubercles, one on each side; and with a single central, short spherical, very short-pedicelled tubercle, pointing straight forward. 2nd segment highly carinated in dorsal line and slightly convex. Thorax also carniated in dorsal line, but separated from 2nd segment by a depression, sloping up considerably to apex and down again to 4th segment, short, with a broad base-short tubercle on the shoulder, convex. Wing-line very slightly laterally expanded at the commencement, flush afterwards. Abdomen circular in transverse section, swollen at the 7th segment which is the stoutest part of the body, decreasing gradually afterwards to the stout triangular cremaster which is curved down at the end. There is a dorsal row of pointed, conical, rather large tubercles, a subdorsal row of much smaller ones on segments 2 to 12 (the dorsal ones only on segments 6 to 11) and a supraspiracular row on segments 3 to 9. The surface is glabrous, shiny, and of a slightly greenish, light yellow. The front tubercle of head, all the dorsal tubercles, the lateral tubercles of segments 6 to 9, are shiny black. There is a shiny black mark dorsally on the very front of the thorax, on the eye-ball, and behind the shoulder-tubercle; also, generally, a black, curved line round the front of the shoulder-tubercle, round the front of the eye-ball, and triangular marks along the terminal margin of wings, six to each; the antennæ are sometimes transversely striated with black and the inner margin of wings, underside of head and space between the antennæ are often thickly lined with black; the abdomen is patched laterally with black on the 10th to 12th segments; the sides, underside, the base of cremaster are marked more or less with the same shiny black. L: 25mm.; B: 7mm.

Habits.—The eggs are laid in batches of 10 to 20 on the underside of a leaf, without order of any sort though close together. The larvæ on emerging proceed to eat the egg-shell and generally demolish each its own totally before moving off. The whole brood then goes off one after the other, closely following each other, to the margin of the leaf which is nearly always an old one and never a very young one. They commence feeding side by side, finishing one leaf after another; and they live like this right through all the stages. They are always badly parasitised and generally by *Dirtera* or flies. They are sluggish in their movements and drop by a silk when disturbed, though not very readily. When about to pupate, each larva goes off by itself and ties itself up by a tail-pad and body-string to a horizontal or perpendicular surface, the attachment being strong and the body-

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

string close. The butterfly takes about a week to emerge and all of one brood do not necessarily emerge the same day because the larvæ take uneven periods to grow, some getting ahead of others; so the pupation of a brood does not all take place on the same day; some individuals may be several days behind the main body. The perfect insects are weak fliers and flutter about, hardly ever flying straight; they frequent trees and are generally found flying round them, mango trees being particular favourites as they are such good hosts for the parasitic mistletoes, *Loranthus* of various species. They fly fairly high as a rule and keep to places where there is tree-growth because of the food-plant which is only found on woody vegetation. They rest with the wings closed over the back, are found on the wing in all weather and occasionally may be seen drinking at moist patches on roads and in river-beds in the hot weather; they also frequent flowers; and generally sit down to enjoy their repast, never hovering or agitating their wings (few whites do this) while thus engaged; they come to a complete rest. The food-plant is *Loranthus* of various species as already stated and it has been bred upon *L. longiflorus*, Desrouss; *elasticus*, Desrouss, and *scurrula*, L., but nearly certainly feeds upon them all. The distribution is the Himalayas up to 7,000 feet; the whole of continental India except the desert tracts; Ceylon. There are 7 species of *Delias* enumerated by Colonel Bingham for British India, with four Races; 11 forms, that is, of which 4 have been alluded to above, and have red terminal markings on the underside. *D. descombesi*, Boisd., from Sikhim, Butan, Assam, Burma, Tenasserim, Siam, Malay Peninsula has red basal markings as well as *D. aglaia*, L., with a nearly similar distribution but extending to Borneo and China; and *D. thysbe*, Cramer, from the same places as *descombesi*. *Delias agostina*, Hewtson, and *D. belladonna*, Fabr., have no red markings on the underside; they are both Himalayan, extending to Assam; the latter from Kulu eastwards extending to China, the former limited westwards by Nepal and not found in China. *Khanda*, Doherty, is a form or race of *thysbe*; *agoranis*, Grose-Smith, of *agostina*.

90. Prioneris sita. ♂. *Upperside*: white, with a slight glaucous tint. Fore and hind wings: the postdiscal markings of the *underside* seen

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

through faintly by transparency; all the veins of the fore wing from base and the veins of the hind wing on the outer third margined narrowly with black, that towards the terminal margin broadens, coalesces, and forms a band on the extreme margin; on the fore wing this is comparatively broad and the black markings more or less triangular; at each vein on the hind wing the band is reduced to mere black lines, slightly broader anteriorly than posteriorly. *Underside*: fore wing white, costa black, apex suffused with yellow, all the veins from the base broadly bordered with black that does not extend towards their apices; an ill-defined transverse, somewhat diffuse; postdiscal black band from veins 1 to 7. Hind wing: rich chrome-yellow up to a postdiscal black band, beyond which the ground-colour is white with a series of large, terminal, vermillion-red, rectangular or truncated, cone-shaped spots; veins from base bordered somewhat narrowly but conspicuously with black. Antennæ brownish black, head and thorax clothed with long bluish-grey hairs, abdomen glaucous white; beneath: the palpi and thorax greyish white, abdomen white. Female very similar, the black edgings to the veins on fore and hind wings on both upper and undersides broader; on the upperside the veins of the hind wing as well as of the fore being black right up to the base. *Upperside*: fore and hind wings with a well marked, dusky-black, postdiscal, diffuse band; cell of the fore wing traversed by three slender, longitudinal, black lines. *Underside*: the yellow and vermillion tints brighter than in the male. Expanse: 86-90mm.

Larva.—Colour dull blue-green. Head and all the segments dotted with minute blue tubercles, those on the head and sides black-tipped; dorsal surface pubescent; a lateral fringe of soft white hairs below the spiracles.

Pupa.—"Bright green. Sharply pointed at the head, with two strong lateral points and keeled on dorsal surface of thoracic segments; an interrupted, yellow, dorsal line, and a short, curved, crimson line on each side below thoracic segments bordering a small, white, irregular, black-speckled spot." (*E. E. Green, MS. note as quoted by Moore.*)

This description has been taken from Bingham's *Butterflies* in the *Fauna of British India*. In another pupa obtained in the Kanara District of the Bombay Presidency there was no sign of the crimson-bordered, black-speckled spot. It was very like the pupæ of the *Appias* (v. Pl. 1, fig. 18*a*) genus only larger and stouter. The butterfly is certainly not ever found in the plain country but will be met with at Mahableshwar hill-station in the Bombay Presidency and, may be, further north as far as Thana in the hilly jungles. It is extremely like *Delias eucharis* at first sight but has much more pointed wings and is a far faster and stronger flier; the red on the underside of hindwing is of a pinker tint and the whole insect is more aristocratic looking. It inhabits the big evergreen jungles of the Western

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA.

Horace Knight, del. Hentschel-Colourstamp

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA.

Explanation of Plate 4.

Fig. 64. Catopsilia pyranthe, ♂ ; 64 a, ♀.

" 65. Colias croceus, ♂ ; 65 a, b, ♀ ♀.

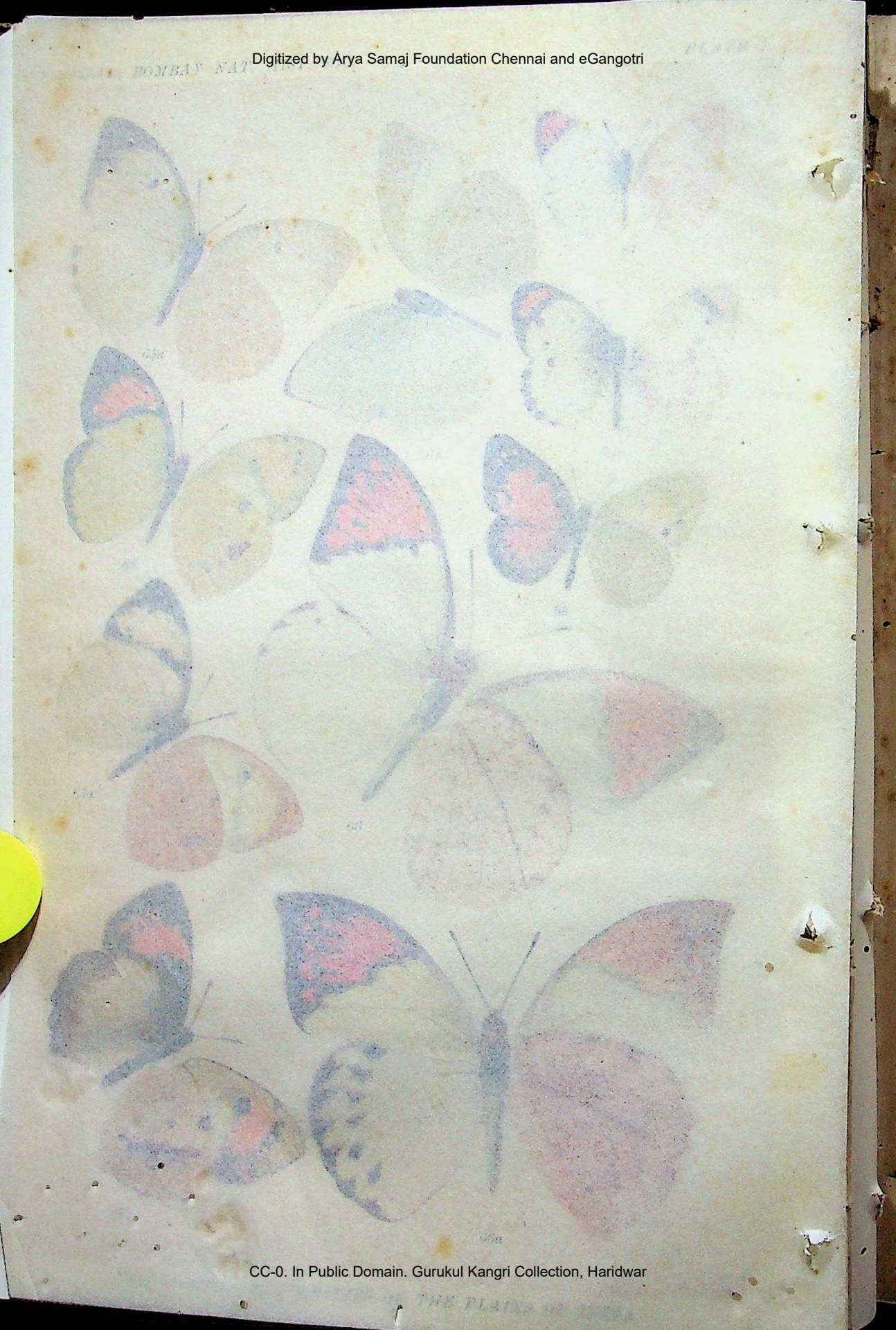
" 66. Hypolimnas misippus, ♂ ; 66 a, ♀.

" 67. Colotis etrida, ♂ ; 67 a, ♀.

" 68. " amata, ♂.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri



CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA.

Explanation of Plate J.

Fig. 64. Catopsilia pyranthe, ♂; 64 a, ♀.

,, 65. Ixias pyrene, ♂; 65 a, b, ♀ ♀.

,, 66. Hebomoia australis, ♂; 66 a, ♀.

,, 67. Colotis etrida, ♂; 67 a, ♀.

,, 68. ,, amata, ♂.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Knight, del.

Digitized by Arya Samaj Foundation Chennai and eGangotri

Ghats in Bombay and generally keeps to the very tops of trees, and the trees are very large and tall. On the hill tops, however, where there are huge boulders and rocks, often with the food-plant growing over them, *P. sita* may be found, in certain localities, within the radius of a long-handled net ; but it is never an easy insect to catch. It is very quick at dodging and never flies slowly although it constantly, in such places, returns again and again over the same route. It appears about 8 o'clock in the morning and likes the sunshine ; after 2 p.m. it disappears. It comes to damp places on roads and in nalla-beds in the hot days preceding the monsoon with *P. antiphates*, *P. doson* and others, and may then be most easily caught by dropping a net over the whole crowd ; but the spots and times where the exact conditions that attract it exist, are not often met with and so it comes about that it is one of the most difficult insects to get. It will come to a decoy under the last conditions so that one may capture a certain number if fortunate in time and place. All thus captured are, however, males ; the females neither fly round the hill-tops nor come to drink on the ground. They may occasionally be seen round the food-plants but even that is rare. The larva feeds upon Capers ; it certainly will be found on *Capparis horrida L.* for the Kanara chrysalis above alluded to was found on a leaf of that climber. The distribution is Southern India and Ceylon. There are two other Indian species, *P. thestylis*, Dblday, with a wide distribution from Mussoorie to Sikhim in the Himalayas ; Assam ; Burma ; Tenasserim and Siam ; and *P. clemantha* from Sikhim, Butan, Assam, Burma, Tenasserim and Siam. All three are remarkably like species of *Delias*.

91. Anaphaeis mesentina. *Wet-season form.* Male *upperside*: white. Forewing : costa to base of vein 11 dusky black, thence continued in a jet-black, gradually widened, curved, short streak along the discocellulars to the lower apex of cell : apical area diagonally with the termen black, the former with six elongate, outwardly pointed spots of the ground colour enclosed one in each of the interspaces 3, 4, 5, 6, 8 and 9. Hindwing : uniform, the black along the venation on the underside seen through by transparency ; termen between veins 2 and 6 somewhat broadly black, with a series of four round spots of the ground-colour in the interspaces ; below vein 2 and above vein 6 the termen is very narrowly black. *Underside* : forewing white, marking similar, more clearly defined, the white spots within the black apical area larger. Hind wing : yellowish-white, all the veins very broadly bordered with black ; interspaces 1, 2, 6 and 7 with cross bars of black, beyond which there is a subterminal, somewhat broad, transverse band of black, between veins 2 and 6. Cilia of both fore and hindwings white alternated with black. The ground-colour on both upper and undersides variable, often cream-coloured above; beneath : in some specimens, the base of cell and the elongate spots in apical area of fore-

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

wing and the whole surface of the hind wing varies to rich chrome-yellow. Female similar; the black markings on both upper and undersides broader, the white spots on black apical area of forewing often sub-obsolete above. Antennæ in both sexes black, sparsely sprinkled with white dots; head, thorax and abdomen above and below white; thorax above often bluish grey. *Dry-season form.* Male and female: similar to male and female of wet-season form, but on the upperside the black markings are narrower, the white markings on the black apical area of forewing broader and longer, and on the hindwing the narrow inner margining to the black on the termen very narrow, somewhat obsolescent; therefore, the white subterminal spots have the appearance of opening inwards. *Underside*: ground colour almost pure white; on the hindwing slightly tinged with yellow. Antennæ, head, thorax and abdomen as in the wet-season form. Expanse: 42-62mm.

Egg.—Is of the usual type of pierid egg, cylindrical with a domed top, twice as high as broad, the dome truncated in a small circle at apex where the 12 meridional ridges, triangular in tranverse section, meet in a thickened ring, their extremities hardly forming teeth round it or on it; the surface is shiny and finely, transversely striated both on the ridges and intervening parts. Colour white when laid, turning orange. L.: ·5mm; B: about ·25 mm.

Larva.—The first stage of the little larva has the head black and shiny, set with long, white hairs; the colour of the body is oily yellowish-green and there is a dorsolateral hair to each segment carrying a globule of liquid at its tip; the anal end is reddish.

The second stage is very much the same as the first in colour of head and body and everything except size which is of course somewhat larger.

The third stage has the head black, shiny with a bright yellow, triangular clypeus and it is set all over with white bristles proceeding from minute tubercles. The body is cylindrical and has the usual subdorsal, dorsolateral, supraspiracular tubercles as well as one subspiracular, each bearing an erect bristle at its tip. Body green with a broad, supraspiracular, purple-brown band.

Fourth stage.—Head shiny black with rather long, erect hairs which are either white or the colour of the head; a yellow line bordering the clypeus distinct. Anal segment rounded in outline, though inclined to be square-ended, about as long as broad, only slightly convex dorsally, with two yellow, vitreous tubercles, one on each side of dorsal line. Body surface oily-looking with the usual tubercles, subdorsal, dorsolateral and supraspiracular, yellow, vitreous and conical, each bearing a short, brown hair which may exude a globule of liquid from its tip; there is a subspiracular tubercle, bearing a longish white hair, as large as these; besides these main tubercles there are many minute ones, each bearing a short, fine,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Knight, del.

Digitized by Arya Samaj Foundation Chennai and eGangotri

white hair; there is a subspiracular fringe of rather long, fine, white hairs which is, however, not very thick. Spiracles broadly round, not large, light with a raised, shiny, thin, brown border. Colour of body greenish ochreous, with a broad supraspiracular band mottled with white, the region below it white enamelled with blotches of green, brown and yellow; there is a dorsal, double green line.

When the larva is full-grown it has the head very dark purplish with a moderately large, rather narrowly triangular, greenish clypeus bordered inside narrowly purple, outside broadly green; surface of head shiny, rough with many tubercles, mostly white, all rather small except a subdorsal one just below vertex and a dorsolateral one about the same height as the apex of clypeus and one near base which are larger and vitreous-yellow; all bear white hairs, the larger ones longer hairs than the rest; labrum, ligula, eyes and second antennal joint whitish; basal antennal joint green. Surface of body as in the last stage, the main tubercles perhaps slightly less conspicuous, each bearing a short, brown, cylindrical hair hardly longer than the numerous lesser white ones which are practically the same as in the last stage also. Spiracles not large, flush, oval, light with a thin, shiny, brownish, slightly raised border, those of segments 2 and 12 larger than the rest. Colour much as in last stage, the purple band only dotted with the little white tubercles; the region below it greenish mottled brown; the base of prolegs purplish, the feet lobed, light greenish like ventrum; the true legs the same with purple patch on basal part; the broad, green-ochreous, dorsal colour finishes square at the hinder margin of segment 12 or nearly so. L: 35 mm.: B: 4mm.

Pupa.—The pupa is somewhat of the type of the *Appias-hyphina* lot although the points are not quite so prominent and the dorsal parts of the segments that bear them are not so flattened. The body is thickest at middle; the 7th segment is swollen at the anterior margin very slightly and runs out over spiracle laterally into a triangular, very prominent, sharp tooth which is flattened above and below and curved up a good deal, it bears the spiracle on its lower surface in its posterior basal angle; the thorax is carinated highly in its dorsal line and the apex of the carination, a little behind the middle of thoracic length, is the highest part of pupa, whence the dorsal line slopes anteriorly to segment 2 and posteriorly to segment 5. The vertex of head is in a plane only slightly inclined towards longitudinal axis of pupa, is short and with the eyes on each side is as broad as segment 2; frons is produced out into a curved-up snout, from a conical base as broad as half the breadth of front of pupa, soon thinning to $\frac{1}{3}$rd of that, then more or less parallel-sided, suddenly constricted shortly before the blunt tip; this snout is as long as segment 2. Segment 2. is carinated in dorsal line though much less than the thorax, is rather convex transversely and has the front margin with a dorsal sinus, the hinder

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

margin straight and slopes up towards thorax at a small angle. The thorax is very convex, not long, highly carinated as already mentioned in dorsal line, the hinder margin a gentle curve meeting the wing-line in a largely-rounded, open angle of rather less than 90°. There is a slight constriction between thorax and abdomen dorsally, none laterally. The pupa at shoulders is broader than at the hinder margin of segment 2, and slightly tuberculate, after which the breadth of the body gradually decreases up to base of the lateral tooth on segment 7; after this it again decreases gradually to cremaster; the keel of the thorax runs into the dorsal line of segment 4; the ventral line of pupa is only slightly curved along suture-line of wings towards apices of these, the ventral line of snout of head is in a higher though parallel plane to the rest. The cremaster is square, forming, as usual, the end of segment 13 which is trapeze-shaped; the former has strong extensor ridges dorsally, ending behind in little knobs, the suspensory booklets being at the extremity between the knobs; the ventral ridges are curved towards each other. The surface of pupa is finely transversely impressed-lined, mostly very irregularly so though fairly closely; on the thorax and front segments the lines are in all directions; the membranes (intersegmental) between segments 8, 9 and 10 are broadly exposed; the subdorsal and supraspiracular tubercles of larva exist here as conspicuous, small, nearly hemispherical bosses on all segments but bear no hairs; the dorsolateral ones are less prominently indicated at hinder margin of segments; the antennæ reach end of wings. The spiracles of segment 2 are indicated by a rounded slight thickening in a curve of front margin of segment 3, rather long and smooth; others are white, broadly oval, of medium size, with a fine, brown border, slightly raised; there are short, fine hairs round eyes and on head vertex only. The colour of pupa is green with a faint supraspiracular band representing those of the larva; top of thoracic carina is black behind, yellowish in front; end of snout is yellow, the sides are black as also shoulder points and teeth of segment 7; tubercles all black; abdomen tinged yellow; wings marked with black; the surface of abdomen is also pitted. Sometimes the pupa is greyish bone-coloured and then the tubercles are bright orange-yellow. L: 23mm.; B: 26mm.

Habits.—The eggs are laid in clusters up to 200 in a batch on the young shoots or the undersides of young leaves; the larvæ eat their way out near the top as a rule and as often as not do not eat the egg-shell; they herd together during the first stages but separate in the last, feeding all the time on the young succulent parts of the plant; they eat voraciously and grow rapidly like all the others of the family. The pupation often takes place in company, one close up against the other on a perpendicular

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

surface or horizontal, on the upperside or underside of a leaf or against a stone or tree-trunk indiscriminately. The fixture is strong at the tail and the body-band is short. The females of a brood emerge before the males. The butterfly is a fairly strong flier and keeps to open places and the hot sunshine; it flies low and is fond of resting on the ground with its wings closed over its back and, in dull weather, the upper wings drawn down between the lower ones. As may be imagined from the number of eggs laid in a single batch, the perfect insects are very numerous wherever they exist, notwithstanding the fact that the larvæ are so subject to parasitic attack. It is an insect of the plains and dry regions more particularly, although it exists up to 6,000 feet elevation in the Himalayas and 8,000 feet in the Nilgiris; it is not uncommon near the sea-coast in Kanara where the rainfall is over 100 inches. Its food-plants are all Capers and it has been bred on *Capparis aphylla*, *C. sepiaria*, *C. heyeana*, *Cadaba indica* and *Mærua arenaria*, the latter two species also belonging to the *Capparideæ*. Its distribution is the Himalayas from Kashmir to Sikhim up to 6,000 feet, and through the plains to Southern India; one specimen is recorded as having been caught in Great Nicobar Island, though it has not been recorded from Burma or Assam; in the west through Persia to Arabia and Africa. There is one form of the insect which by some is considered another species, *A. taprobana*, Moore, that occurs in Ceylon, in which the male resembles the female of the typical form and the female has the whole apical area of the forewing black; in both sexes the underside of hindwing has the ground-colour, a rich chrome-yellow.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

NOTES ON A BIRD COLLECTING TRIP IN THE BALAGHAT DISTRICT OF THE CENTRAL PROVINCES.

BY

E. A. D'ABREU, F.Z.S.

Early in January 1912, I had the good fortune to be deputed to collect birds in the Balaghat District for the Nagpur Museum. The express purpose of the expedition was to secure such specimens as were not represented in the Museum and accordingly no wholesale slaughter of birds was indulged in, only such specimens were shot as were needed.

A list of the birds seen and identified with certainty is given, but this cannot be considered complete, for only a part of the district was traversed and that very hurriedly.

The District of Balaghat lies to the north-east of Nagpur. It is bounded on the north by the Mandla District, on the south by the Bhandara District, west by Seoni and east by the districts of Bilaspur and Drug. It is mostly hilly except for the valleys of the Wainganga and the Banjar. To the north-east is the Topla Plateau. Heavy forests are plentiful and large quantities of timber exported. Other industries appear to be mainly agricultural, and cattle-rearing is carried on in some parts. Manganese ore is plentiful and there are several companies excavating it.

The party consisted of five : myself, a fieldman, two peons, one of whom was kindly lent to us by the Forest Department, and a cook. Before beginning this account I would like to mention that this is the first time I have collected in the Central Provinces and I had absolutely no knowledge of the country. Country carts were available in most places and these formed our mode of conveyance from one stage to another.

The party left Nagpur on the morning of the 3rd and reached Balaghat in the afternoon ; here we found carts and the Forest Officer's shooting chakra waiting for us. A chakra is a bullock cart built on a very light scale, suitable to seat one or two persons at the most. This chakra differed a great deal from the common ones used by the natives ; there was a hood to it and the seat was in the form of a chair and on either side of it was a rack to rest one's guns in. A common practice in the Central Provinces is to shoot from off a bullock cart, antelope and such like are so used to seeing these vehicles pass near them that they have lost all fear of them and the sportsman is able to get well within range which most probably he could not do on foot. Carts can also be used in forests if the ground is not very uneven and the forest not too dense ; moreover most forests have cart roads running through them.

On our arrival at Balaghat station we proceeded to the Dak Bungalow

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

for the night and that very evening collected our first specimen, a Black-headed Oriole (*Oriolus melanocephalus*). This bird and the Indian Oriole (*O. kundoo*) are the common orioles of the Central Provinces. At Nagpur *O. kundoo* is common while *O. melanocephalus* is rare, but in this district the reverse seems to be the case. *O. melanocephalus* is common everywhere while *O. kundoo* was only met with at Baihar.

The next day a move was made to the Tikari Inspection Hut, a distance of seven miles from Balaghat. Here we were near the hills and close to heavy forest. The Bungalow is between the villages of Pipartola and Tikari; a nulla runs along the side of the Bungalow and close to the Tikari village is a large jheel which we visited the next morning. As we approached it a large flock of Painted Storks were visible on a tree on the other side of the jheel, Egrets of two or three species studded the edges, their white plumage showing distinctly among the green surroundings, a Darter or two were seated on adjoining trees and the usual set of waders (Herons, Sandpipers, etc.) were to be seen here and there in all directions but no ducks were visible.

We decided to begin with the Painted Storks, but they flew off in a body on my approach to a tree on the other side of the jheel. I attempted to follow but in a bend of the jheel came across an Adjutant Stork feeding all by himself. He was more of a prize to me, being the first one I had set eyes on in the Central Provinces, but before I could put in a cartridge suitable to his size, he was off and perched himself on a distant tree. He was followed up but would not allow me to get within range. In the meantime his painted brethren had also made themselves scarce but we consoled ourselves with the hope of shooting them later on. We returned to the bungalow working our way along the nullah; here we secured specimens of Tickell's Flowerpecker (*Dicæum erythrorhynchus*) and a Jungle Owlet *Glaucidium radiatum*). The latter seemed quite awake although it was midday. Near the nullah we saw a troop of about fifty monkeys (*Presbytis entellus*), most of them were squatting on the ground and gave one the impression of labourers working in a field. They showed no fear of us and when a gun was levelled at them they did not seem to know the meaning of it. None were shot as we did not want them. We visited the same spot the next day and we found the monkeys still on the same ground. I made it a point to visit the spot every day and to my surprise I found them on the same spot for six days. In the afternoon shots were fired at some White-necked Storks but none were bagged. The next morning we visited the jheel again and the Painted Storks were on the same tree they had occupied the day before. This time I sent my fieldman for them with instructions to fire if he got well within range, while I hid against the tree they made for yesterday. To my delight they went through the same tactics they did before, but instead of settling straight away, they took it

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

into their heads to fly in a circle round the tree, prior to settling. It was all up, a long shot was chanced, a few feathers fell to the ground and the storks betook themselves to pastures new. We did the same. I made a bee line for the forest country while the fieldman consoled himself with a Brahminy Kite and made for the Bungalow, shooting *en route* a pair of Greenshanks and a Black Vulture. In the forest country I secured a pair of Rose Finches, a Crested Goshawk and a large Cuckoo-Shrike. The Rose Finch is a migratory bird with us, the hen is a plain bird resembling a hen-sparrow while the cock is of a beautiful rose tint. It is a common cage bird in parts of India, especially in Behar, where it is termed the Tuti. They never seem to survive through the warm weather. On my return to the bungalow at about 1 p.m. a smell seemed to pervade the whole place and the vulture was pointed out to me as the source of the same. There was no getting away from it, it could be perceived in all the rooms, even the breakfast that day had a taint of it. However the bird had to be dealt with, but it took us some time to make up our minds to skin it, nevertheless we had his skin off by sunset but we took care to sprinkle some spirit over him to deaden the smell. We had him fixed up before noon the next day and his carcase was thrown away and it was not long before the crows spotted it and this attracted the kites and other vultures. As there were no vultures in the museum we decided to finish off with them as we were about it, so a white-backed one (*Pseudogyps bengalensis*) was shot. It dropped into a nullah and while I was hunting for it a crowd of servants came calling for me saying that the 'burra saheb' wanted to see me. This was the Deputy Commissioner who was passing through and hearing the crack of my gun came to see what I had shot. He was much interested in natural history and examined with keenness the specimens I had already collected, moreover, he very kindly offered to help the expedition, an offer which was heartily accepted. Our second vulture did not smell so bad as the first and on close inspection looked quite a handsome bird; his bill was of a fine bluish tint, his neck was grey, his back spotlessly white and his black underparts were striated with white, while round his neck was a collar of white down.

The jheel was visited again the next day but it was deserted, only a Darter and another bird were sitting on the trees patronised by the storks. The Darter soon made himself scarce but we bagged the other bird which turned out to be the Little Cormorant (*Phalacrocorax javanicus*).

Our attention was now exclusively devoted to the forest country. Sambhar, spotted deer and wild pig were very plentiful and we frequently disturbed them as we shot at small birds with our 'fourten.' Once I shot at a minivet and a pig jumped up a few feet from the place I stood. We came across the pugs of bears and panthers but never saw any in the flesh. One evening we disturbed a spotted deer with a very good head and that

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

very evening came across a pig lying down. I pointed it out to the forest guard who was with me at the time but he insisted on its being a log of wood till piggy took to his heels. We secured for ourselves a Chestnut-bellied Nuthatch and a pair of Scarlet Minivets (*Pericrocotus speciosus*); the cock is a scarlet and black bird while the hen is yellow and grey. Strange to say, the cock minivet, the moment he saw me, flew to a tree with red leaves and I have often noticed on the Himalayas *P. brevirostris*, a bird similarly coloured, do the same. Can this be an instance of protective coloration ?

Our last day at Tikari was almost a blank; only a Pale Harrier was collected, but a bird resembling the Nilgiri Thrush was seen in the forest country.

Leaving Pipartola, a move was made to Somnapur, passing Laughur *en route*. Laughur is on the hills at an altitude of 1,933 feet; it is a great place for big game shooting. After we had passed Laughur, we saw Peafowl, Jungle Fowl and Spotted Deer on the road. Once we heard the screeches of birds resembling the call of the Malabar Pied Hornbill and attempts were made to secure them, but they were not seen. Along the roadsides lizards of the families *Agamidæ* and *Scincidæ* were plentiful and I recognised *Mabuia carinata* and *M. macularia* amongst them. The Southern Red-whiskered Bulbul, Sunbirds, White-eyes, Paradise and Grey-headed Flycatchers were very common at Laughur.

We reached Somnapur at night and next morning the forests near the bungalow were visited. Some sambhar and monkeys were seen but nothing of special interest in the bird line. In the afternoon we had better luck, a jheel was visited and an Egret, some Whistling Teal and a pair of Little Ringed vers secured. A Redshank and some Jacanas were seen.

On visiting the jheel the next day an Adjutant and a Heron were seen seated on a tree. On my approach the Stork took to his wings but I secured the Heron which proved to be the Common Heron (*Ardea cinerea*). The Jacanas were again seen and to my delight I shot one which rolled over apparently hard hit. The Chaprassi waded for it while I moved on towards the end of the jheel after some other birds and on my return he declared the Jacana could not be found. On my way home a Pale Harrier was shot; it was observed following a pariah dog and sitting down near it whenever the dog sat down. When about two miles from the bungalow, a large Stork suddenly flew up from a ditch and sat on a tree. It was shot and turned out to be the Lesser Adjutant (*Leptoptilus javanicus*). Somnapur is a great place for small birds, the trees round the bungalow simply swarmed with them, Bhimrajas (Racket-tailed Drongos) Mynas, Babblers, Hornbills, Koopoes, Barbets, Woodpeckers, Parakeets, Bee-eaters, Doves, Flycatchers, Wagtails, Bulbuls, Tits, Mini-

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

rets, Shrikes, Kingcrows, Sunbirds, Pipits, all were plentiful, while Peafowl and Red Jungle Fowl were seen in greater numbers than elsewhere. In the course of our rambles we came across a large flock of Jungle Fowl in an open glade. We did not get a shot but we noticed that near the place where the fowls were, there was a sort of 'machan.' This we made use of the next day and at precisely the same time the birds came out, but they were out of range though moving towards us. A cock bird came well within range, but we wanted a hen, so we waited, but some cattle passing through the glade drove the birds away. We waited, nevertheless, in the hope that they may appear again, and as it got dusk, the Nightjars began to utter their cries and the air was alive with them. From their sizes they appeared to belong to three different species. One that flew close to us was shot and turned out to be Horsfield's Nightjar (*C. macrurus*). Among other birds collected here were the White-browed Blue Fly-catcher, the Pigmy Woodpecker, the White-eyed Buzzard-Eagle, the Pale Harrier, the Common Snipe, the Western Blossom-headed Parakeet and the Large Indian Parakeet.

A Crested Serpent Eagle (*Spilornis cheela*) was also shot by mistake. If there is an eagle that baulks the collector it is this species. He has many phases of coloration and I have got him in every phase in the Nagpur Museum, so do not wish to have anything more to do with him; yet he will come in my way. If I see an eagle the identity of which is uncertain and shoot it accordingly, it is bound to be a Cheela. On the other hand if I spare a bird thinking it to be a Cheela, it is bound to turn out something else. Parakeets of three species were very plentiful all over the district; these were the Rose-ringed Parakeet, the Western Blossom-headed Parakeet and the Large Indian Parakeet, but the Blossom-headed Parakeet far outnumbered the other two. Of Doves five species were noticed, namely the Spotted Dove, Ring Dove, Little Brown Dove, Rufous Turtle Dove and the Red Turtle Dove. The Spotted Dove far outnumbered the others at Pipartola and Somnapur; while at Baihar, Muki and on the plateau the Ring Dove predominated and at Paraswara the Rufous-Turtle Dove was seen in greater numbers than elsewhere. The Rufous-backed Shrike appears to be the common Shrike of the district for we noticed him everywhere; the Bay-backed Shrike was only seen in numbers between Pipartola and Balaghat.

From Somnapur we moved on to Muki *via* Baihar. The country between Baihar and Muki is not hilly, nor are the forests dense. Two large streams were crossed, the Tonaur near Baihar and the Banjar near Muki. Black Buck, Green Pigeons and a few Harriers were about, the only things seen on the road. From Muki we journeyed on towards the Topla plateau and after ascending the ghaut the country gradually opened out into an undulating plain almost devoid of trees. A Crested Hawk-Eagle was shot

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

near the ghaut and further on large numbers of Coursers were seen and a few secured.

Parsatola was reached at about 2 p. m. Here we were in an open plain covered with spear grass. Cattle rearing seemed to be the chief occupation of the people, for large herds were seen in all directions. Black Buck and Nilghai were plentiful and the latter might have afforded some excellent runs for a mounted spearman, for the country was suitable in every way. Foxes and Hares were also found and I was told that a Cheeta inhabited the place. The first thing seen next morning was a Fox, it was eventually shot and turned out to be the Common Indian Fox (*Vulpes bengalensis*).

On the 22nd nothing in particular was shot, some Black Ibis, Stone-Curlews and a small dark-coloured species of Quail were seen. Attempts were made to shoot some Saruses, but without success, and I had to content myself with a Rufous Fantail-Warbler (*Cisticola cursitans*).

We returned from Parsatola on the 23rd, shooting some Green Pigeons on the way, but they turned out to be the ordinary ones (*Crocopus chlorogaster*). As we neared the hills Nilghai were very plentiful, and a bull which appeared to have a good pair of horns was shot, but they only taped 7·5 and 8 inches. Towards Baihar flocks of peafowl were seen and at dusk a Four-horned Antelope was shot on the roadside. It was not a perfect specimen, the anterior horns were mere knobs and the posterior ones measured 2·8 inches. At Baihar a large Bandicoot Rat (*Nesocia bandicota*) was picked up on the road. It measured about 1 foot 9 inches. From Baihar to Paraswara the country is more or less open except near Sitadongra where it is hilly. Jheels were visited on the way but only Teal of the ordinary kind (*Nettium crecca*) were seen on the first two. The next one seemed more interesting, two White-necked Storks, a Painted Stork and some Herons were in evidence at one end and a flock of White Ibises and an Open-bill at the other. On my approach they all made themselves scarce, but the White-necked Storks were the last to leave and as they rose one was bagged. Further on we came across more White-necked Storks in a ditch on the road side and here they took no notice of us, though we were only a few yards from them. The next jheel contained a flock of Ibises and some Herons. A shot at the Ibises proved a failure but a large flock of Teal rose out of the rushes and among them were two ducks of a larger kind, the second barrel discharged into them only resulted in bringing a Teal to the ground. An Egret, probably of the lesser or larger species, was also shot at and fell to the ground, apparently stunned for when the peon went to pick it up it recovered and flew off.

At Paraswara we found Saruses very plentiful, but they were very shy and always flew off before we got within range.

On the 27th I visited a jheel about 3 miles from the bungalow. Four

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

young Black-necked Storks and a pair of Saruses were seen. Shots were fired at the Saruses in preference and one was evidently hit for he settled after flying a short distance; two more shots were had at him but without effect. The storks meanwhile had settled in some fields about a mile away. Some cover being available one was shot. The others hovered over it and an adult female bird came flying towards it. I was still well concealed and the contents of my second barrel brought her to the ground. On our way home two Black Buck ran quite close to us, but we had no rifle with us at the time.

On the 28th the jheel in front of the bungalow was patronised. Several Coots, Dabchicks and Bronze-winged Jacanas were seen and two of the latter and a Snipe were bagged. Species of Herons and Egrets which we wanted and a Pied Harrier were seen but not secured. We tried for these the next day but had to content ourselves with a Marsh Harrier. A pair of Saruses were again tried for, but with the usual result. Snipe and Quail were very plentiful here and a little shooting was indulged in. Five shots brought to bag seven birds. The Snipes were Fantails and Pintails and the Quails were black-breasted ones. On our way back Saruses were again seen, and this time I waited till it got dark and then tried to get within range, but it was of no avail.

Leaving Paraswara a move was made to Lamtha and the jheel at Bhondua visited. Ducks were seen in the middle of the jheel and Storks and Saruses at the edges. The Ducks being out of range we tried our luck again at Saruses but with the same result. At Lamtha we took train and returned to Nagpur.

LIST OF BIRDS OBSERVED IN THE BALAGHAT DISTRICT, CENTRAL PROVINCES.

Order Passeres.

1.	Corvus macrorhynchus ..	The Jungle-Crow.
2.	Corvus splendens	The Indian House-Crow.
3.	Dendrocitta rufa	The Indian Tree-pie.
4.	Machlolophus haplonotus ..	The Southern Yellow Tit.
5.	Argya caudata	The Common Babbler.
6.	Argya malcolmi	The Large Grey Babbler.
7.	Crateropus canorus ..	The Jungle Babbler.
8.	Pyctorhis sinensis ..	The Yellow-eyed Babbler.
9.	Zosterops palpebrosa ..	The Indian White-eye.
10.	Ægithina tiphia	The Common Iora.
11.	Chloropsis jerdoni ..	The Jerdon's Chloropsis.
12.	Molpastes hæmorrhous ..	The Madras Red-vented Bulbul.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

13.	Otocompsa fuscicaudata ..	The Southern Red-whiskered Bulbul.
14.	Sitta castaneiventris ..	The Chestnut-bellied Nuthatch.
15.	Dicrurus ater	The Black Drongo.
16.	Dicrurus cærulescens ..	The White-bellied Drongo.
17.	Dissemurus paradiseus ..	The Larger Racket-tailed Drongo.
18.	Orthotomus sutorius ..	The Indian Tailor-bird.
19.	Cisticola cursitans ..	The Rufous Fantail-Warbler.
20.	Hypolais rama	Sykes's Tree Warbler.
21.	Prinia sylvatica	The Jungle Wren-Warbler.
22.	Prinia inornata	The Indian Wren-Warbler.
23.	Lanius vittatus	The Bay-backed Shrike.
24.	Lanius erythronotus ..	The Rufous-backed Shrike.
25.	Lanius cristatus	The Brown Shrike.
26.	Tephrodornis pondicerianus.	The Common Wood-Shrike.
27.	Pericrocotus speciosus ..	The Indian Scarlet Minivet.
28.	Pericrocotus peregrinus ..	The Small Minivet.
29.	Pericrocotus erythropygius..	The White-bellied Minivet.
30.	Campophaga sykesi ..	The Black-headed Cuckoo-Shrike.
31.	Graucalus macii	The Large Cuckoo-Shrike.
32.	Oriolus kundoo	The Indian Oriole.
33.	Oriolus melanocephalus ..	The Indian Black-headed Oriole.
34.	Pastor roseus	The Rose-coloured Starling.
35.	Sturnus menzbieri ..	The Common Indian Starling.
36.	Temenuchus pagodarum ..	The Black-headed Myna.
37.	Acridotheres tristis ..	The Common Myna.
38.	Sturnopastor contra ..	The Pied Myna.
39.	Siphia parva	The European Red-breasted Flycatcher.
40.	Cyornis superciliaris ..	The White-browed Blue Flycatcher.
41.	Cyornis tickelli	Tickell's Blue Flycatcher.
42.	Alseonax latirostris ..	The Brown Flycatcher.
43.	Culicicapa ceylonensis ..	The Grey-headed Flycatcher.
44.	Terpsiphone paradisi ..	The Indian Paradise Flycatcher.
45.	Rhipidura albifrontata ..	The White-Browed Fantail Flycatcher.
46.	Pratincola caprata ..	The Common Pied Bush-Chat.
47.	Pratincola maura	The Indian Bush-Chat.
48.	Ruticilla rufiventris ..	The Indian Redstart.
49.	Cyanecula suecica ..	The Indian Blue-throat.
50.	Thamnobia cambaiensis ..	The Brown-backed Indian Robin.
51.	Copsychus saularis ..	The Magpie-Robin.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

51A.	Geocichla cyanonotus ..	The White-throated Ground-Thrush.
52.	Uroloncha malabarica ..	The White-throated Munia.
53.	Stictospiza formosa ..	The Green Munia.
54.	Sporæginthus amandava ..	The Indian Red Munia.
55.	Carpodacus erythrinus ..	The Common Rose-Finch.
56.	Gymnorhis flavicollis ..	The Yellow-throated Sparrow.
57.	Passer domesticus ..	The House-Sparrow.
58.	Hirundo smithii	The Wire-tailed Swallow.
59.	Motacilla alba	The White Wagtail.
60.	Motacilla maderaspatensis ..	The Large Pied Wagtail.
61.	Motacilla melanope ..	The Grey Wagtail.
62.	Anthus maculatus ..	The Indian Tree-Pipit.
63.	Anthus striolatus	Blyth's Pipit.
64.	Anthus rufulus	The Indian Pipit.
65.	Mirafra erythroptera ..	The Red-winged Bush-Lark.
66.	Ammomanes phœnicura ..	The Rufous-tailed Finch-Lark.
67.	Pyrrhulauda grisea ..	The Ashy-crowned Finch-Lark.
68.	Arachnechthra asiatica ..	The Purple Sunbird.
69.	Dicœum erythrorhynchus ..	Tickell's Flower-pecker.
70.	Pitta brachyura	The Indian Pitta.

ORDER PICI.

71.	Liopicus mahrattensis ..	The Yellow-fronted Pied Woodpecker.
72.	Iyngipicus hardwickii ..	The Indian Pigmy Woodpecker.
73.	Brachypternus aurantius ..	The Golden-backed Woodpecker.

ORDER ZYGODACTYLI.

74.	Thereiceryx zeylonicus ..	The Common Indian Green Barbet
75.	Xantholæma hæmatocephala.	The Crimson-breasted Barbet.

ORDER ANISODACTYLI.

76.	Coracias indica	The Indian Roller.
77.	Merops viridis	The Common Indian Bee-eater.
78.	Ceryle varia	The Indian Pied Kingfisher.
79.	Alcedo ispida	The Common Kingfisher.
80.	Halcyon smyrnensis ..	The White-breasted Kingfisher.
81.	Lophoceros birostris ..	The Common Grey Hornbill.
82.	Upupa indica	The Indian Hoopoe.

ORDER MACROCHIRES.

83.	Cypselus affinis	The Common Indian Swift.
84.	Caprimulgus macrurus ..	Horsfield's Nightjar.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

ORDER COCCYGES.

85. Hierococcyx varius .. The Common Hawk-Cuckoo.
86. Eudynamis honorata .. The Indian Koel.
87. Centropus sinensis .. The Common Coucal or Crow-Pheasant.

ORDER PSITTACI.

88. Palæornis nepalensis .. The Large Indian Paroquet.
89. Palæornis torquatus .. The Rose-ringed Paroquet.
90. Palæornis cyanocephalus .. The Western Blossom-headed Paroquet.

ORDER STRIGES.

91. Scops bakkamœna .. The Collared Scops Owl.
92. Athene brama .. .. The Spotted Owlet.
93. Glaucidium radiatum .. The Jungle Owlet.
94. Ninox scutulata .. .. The Brown Hawk-Owl.

ORDER ACCIPITRES.

95. Otogyps calvus .. .. The Black Vulture.
96. Pseudogyps bengalensis .. The Indian White-backed Vulture.
97. Neophron ginginianus .. The Smaller White Scavenger Vulture.
98. Aquila vindhiana .. .. The Indian Tawny Eagle.
99. Spizætus cirrhatus .. The Crested Hawk-Eagle.
100. Spilornis cheela .. .. The Crested Serpent-Eagle.
101. Butastur teesa .. .. The White-eyed Buzzard-Eagle.
102. Haliastur indus .. .. The Brahminy Kite.
103. Milvus govinda .. .. The Common Pariah Kite.
104. Elanus cæruleus .. .. The Black-winged Kite.
105. Circus macrurus .. .. The Pale Harrier.
106. Circus melanoleucus .. The Pied Harrier.
107. Circus æruginosus .. .. The Marsh Harrier.
108. Astur badius .. .. The Shikra.
109. Lophospizias trivirgatus .. The Crested Goshawk.
110. Pernis cristatus .. .. The Crested Honey-Buzzard.
111. Tinnunculus alaudarius .. The Kestrel.

ORDER COLUMBÆ.

112. Crocopus chlorogaster .. The Southern Green Pigeon.
113. Turtur suratensis .. .. The Spotted Dove.
114. Turtur cambayensis .. The Little Brown Dove.
115. Turtur risorius .. .. The Indian Ring Dove.
116. Turtur orientalis .. .. The Rufous Turtle-Dove.
117. Œnopopelia tranquebarica .. The Red-Turtle-Dove.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

ORDER GALLINÆ.

118.	Pavo cristatus	The Common Peafowl.
119.	Gallus ferrugineus ..	The Red Jungle-fowl.
120.	Coturnix coromandelica ..	The Black-breasted Quail.
121.	Francolinus pondicerianus ..	The Grey Partridge.

ORDER GRALLÆ.

122.	Fulica atra	The Coot.
123.	Grus antigone	The Sarus.
124.	Anthropoides virgo ..	The Demoiselle Crane.

ORDER LIMICOLÆ.

125.	Œdicnemus scolopax ..	The Stone-Curlew.
126.	Cursorius coromandelicus ..	The Indian Courser.
127.	Metopidius indicus ..	The Bronze-winged Jacana.
128.	Hydrophasianus chirurgus ..	The Pheasant-tailed Jacana.
129.	Sarcogrammus indicus ..	The Red-wattled Lapwing.
130.	Ægialitis dubia	The Little Ringed Plover.
131.	Himantopus candidus ..	The Black-winged Stilt.
132.	Totanus hypoleucus ..	The Common Sandpiper.
133.	Totanus glareola	The Wood Sandpiper.
134.	Totanus ochropus.. ..	The Green Sandpiper.
135.	Totanus fuscus	The Spotted Redshank.
136.	Totanus glottis	The Greenshank.
137.	Gallinago cœlestis ..	The Common Snipe.
137*a*.	Gallinago stenura ..	The Pintail Snipe.

ORDER STEGANOPODES.

138.	Phalacrocorax fuscicollis ..	The Indian Shag.
139.	Phalacrocorax javanicus ..	The Little Cormorant.
140.	Plotus melanogaster ..	The Indian Darter.

ORDER HERODIONES.

141.	Ibis melanocephala ..	The White Ibis.
142.	Inocotis papillosus ..	The Black Ibis.
143.	Dissura episcopus ..	The White-necked Stork.
144.	Xenorhynchus asiaticus ..	The Black-necked Stork.
145.	Leptoptilus dubius ..	The Adjutant.
146.	Leptoptilus javanicus ..	The Smaller Adjutant.
147.	Pseudotantalus leucocephalus	The Painted Stork.
148.	Anastomus oscitans ..	The Open-bill.
149.	Ardea manillensis ..	The Eastern Purple Heron.
150.	Ardea cinerea ..	The Common Heron.
151.	Herodias intermedia ..	The Smaller Egret.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

152.	Herodias garetta ..	The Little Egret.
	Herodias alba	The Large Egret is probably found in the District as well.
153.	Bubulcus coromandus ..	The Cattle Egret.
154.	Ardeola grayi	The Pond Heron.

ORDER PHÆNICOPTERI.

No flamingoes were seen by me but I was told that they were occasionally to be met with at Somnapur.

ORDER ANSERES.

155	Dendrocycna javanica ..	The Whistling Teal.
156.	Nettopus coromandelianus..	The Cotton Teal.
157.	Chaulelasmus streperus ..	The Gadwall.
158.	Nettium crecca	The Common Teal.
159.	Dafila acuta	The Pintail.

ORDER PYGOPODES.

162.	Podicipes albipennis ..	The Dabchick.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

BOMBAY NATURAL HISTORY SOCIETY'S MAMMAL SURVEY OF INDIA.

REPORT BY R. C. WROUGHTON, F.Z.S.

COLLECTION ...	...	No. 5.
LOCALITY ...	...	Dharwar.
DATE ...	...	November-December 1911, February-March 1912.
COLLECTED BY...	...	Mr. G. C. Shortridge.
EARLIER REPORTS	...	No. 1, E. Khandesh, Vol. XXI, p. 392.
		No. 2, Berars, Vol. XXI, p. 820.
		No. 3, Cutch, Vol. XXI, p. 826.
		No. 4, Nimar, Vol. XXI, p. 844.

Dharwar, the district in which the present collection was made, is situated about 15° 30′ N. Lat. and 76° E. Long. At the commencement of the last century Sir W. Elliot, I.C.S., collected the mammals of this district and published a paper on them in the Madras Journal of Literature and Science, 1839. As a description of the district I cannot do better than reproduce here the Introduction to his paper.

"The district of India, in which the animals contained in the following list were procured, is a part of the high tableland towards the south of the Dekhan, commonly called the Southern Mahratta Country, and constitutes the British zillah of Dharwar. It ought, likewise, geographically speaking, to include the small province of Sunda, which, according to the political arrangement of the country, is placed under the zillah of Canara, in the Presidency of Madras."*

"The general boundaries are the rivers Kistnah and Bhima on the north and north-east; the Tungabhadra river on the south; the Nizam's territory on the east, and the Syhadri range of mountains on the west. The latter are generally called the Ghats. . . . . ."

* Since this description was published the boundary of the Dharwar District has been pushed back eastwards and the area referred to in this para. is now part of the Kanara District which will be dealt with in my next Report.—R. C. W.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

"The general face of this tract is much diversified and affords a great variety of elevation and of geological structure thereby materially affecting the distribution and the habitat of the different species of animals existing within its limits."

"The whole of the western portion is a thick forest, extending from the outskirts of the mountainous region of the Ghats to their summits, and clothing the valleys that extend between their ridges. It abounds with the teak and various other lofty forest trees, festooned by enormous perennial creepers. The bamboo forms a thick and luxuriant underwood in some places, while others are entirely open, and the banks of many clear and rapid streams flowing through it, abound with the black pepper plant, the wild cinnamon and other odoriforous shrubs. Portions of this forest are often left entirely untouched by the axe or knife, forming a thick impervious shade for the growth of the black pepper, cardamom, and Mari palm (*Caryota urens*). These are called 'kans' and are favourite resorts of wild animals."

"To the east of the regular forest lies a tract called the Mulnad, or rain-country (though the native of the plains often includes the 'jhari,' or forest, under the same denomination), in which the trees degenerate into large bushes, the bamboo almost entirely ceases, and cultivation, chiefly of rice, becomes much more frequent. The bushes consists of the karunda, the pallas, etc. It abounds in tanks and artificial reservoirs for purposes of irrigation."

"East of the Mulnad is a great extent of alluvial plain producing fine crops of wheat, cotton, maizes, millet, etc. (*Holcus sorghum*, *Panicum italicum*, *Cicer arietinum*), and on the Nizam's frontier are found a succession of low dry hills, with tabular summits often rising in abrupt scarped precipices, and intersecting and traversing the plains in various directions. They are clothed with low thorny jungle of babul and acacia, and their bases, and the valleys between, composed of a light sandy soil, are cultivated with millet, vetches, etc. (*Panicum spicatum*, *Panicum miliare*, *Phaseolus max*, *Phaseolus mungo*, &c.)."

"The first or mountainous division consists chiefly of micaceous clay, and other schists, which to the northward are succeeded by

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

basaltic or trap formation. The Mulnad is composed of undulating clay-slate hills, which become covered with basalt to the north. This trap formation extends in a slanting direction from south-west to north-east nearly coinciding with a line drawn from Sadasheaghur on the coast, to Beejapoor and Sholapoor—and, what is remarkable, is almost coincident with that marking the separation of the two great tribes of the population using totally distinct languages—the Mahrattas and Canarese."

"The hills to the north-east and east are all of primitive sandstone, sometimes resting on schists, sometimes immediately on the granite, which latter is the rock nearest the surface in the central and eastern plains. But a well defined range of hills to the south-west, called the Kupputgud, is entirely composed of micaceous and clay-slates, resting on granite. The hills more to the north and north-west are basaltic. The extensive plains lying between these different lines of hills and eminences are composed of the rich, black mould, called regur, or cotton ground, resulting from decomposed basaltic rocks. To the north-east a considerable tract of limestone is found, resting on the sandstone, about Bagalkote, Badami Hungund, Mudibihsal, etc. . . . "

Mr. Shortridge has furnished the following short notes on the actual localities in which he collected:—

"Dharwar—Chiefly red Mulnad country, except to the north, where there are large areas of black cotton soil. Flat or undulating with a few bare rocky hills to the east. Those on the west being more or less covered with scrub which gradually changes into forest as the Kanara border is approached. Large areas under cultivation. Altitude 2,500 feet."

"The prolific results of the collections throughout the district are largely due to the active and invaluable assistance received from Mr. R. M. Phillips, D.S.P., whose guest I was during the whole of my two months' stay in Dharwar, while many thanks are also due to Mr. E. Macconochie, I.C.S., the Collector of the District, for his kindness and help, particularly in instructing and causing the native officials in all of the places I visited to give me a great deal of assistance."

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

"Alnavar and Avatgi—About 24 miles west of Dharwar, on the borders of North Kanara. Red soil and where there is no cultivation thick Mulnad scrub or partly open country covered with long grass. A number of hills, largely covered with teak and other forest trees. Altitude about the same as Dharwar.

"Short camps only were made at these places."

"Devikop—26 miles south of Dharwar. On the borders of the Kanara forest which starts abruptly on it, south and west of the village. Flat or slightly undulating with chiefly open and cultivated country to the north and north-east. Altitude 2,000 feet."

"Gadag and Lakundi—Although Gadag itself is situated on a patch of red soil the district proved a perfect centre for working the black cotton country which extended in flat and almost treeless areas in every direction, only broken in the south by a few distinct ranges of rocky hills. Cotton is grown over the whole country while the few scattere trees are mostly babul which fringe the roads forming not very shady avenues. The chief cover for any of the larger animals being stray patches and hedges of prickly pear.

"I stayed here for nearly a fortnight with Mr. T. J. Spooner, a keen and enthusiastic life member of the Society, and owing to his help and knowledge of the country I was able to get a very representative collection from the black cotton district."

Hawsbhavi—About 15 miles to the west of Bayadi Station in the Southern Dharwar District, open, undulating red sandy country in all directions, with scattered babul trees and toddy palms, patches of black cotton country to the north and some low ranges of rocky hills to the east.

"Large areas under cultivation, many of the villages surrounded by mango trees, cocoanut and areca palms.

"I camped here for ten days, afterwards moving on to Tillevelly, a neighbouring village."

"Honkan—A small village situated on the banks of the

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Varadi river, a permanently running clear stream that eventually joins the Tungabhadra.

"At this point the river forms the boundary between the Dharwar District and north-western Mysore.

"The country is quite flat and covered with very dense scrub jungle, largely composed of low deciduous trees, thick masses of Karunda and other bushes which are curiously even in height.

"The country to the east and the Mysore territory on the south bank of the river are more open, leading eventually to black cotton plains. One of the most curious things noticed here was the frequent occurrence of the black buck well within the thickest parts of the jungle which afford cover for its much more natural inhabitants, chital, pig and four-horned antelope, while on one occasion during a beat I witnessed the unusual sight of a number of chital and black buck simultaneously crossing a road running through the centre of a particularly large and thick piece of jungle."

"Samasgi—About twelve miles to the north of Honkan situated at the point where the three territories of Southern Dharwar, Mysore and Kanara meet.—. . . . . Samasgi which is a small native village is situated in high deciduous forest which surrounds it on all sides.

"There are isolated patches of cultivation and many dense lantana thickets. Undulating, almost hilly country, the forest being similar to those around Devikop."

The collection contains in all 749 specimens, belonging to 51 species, in 40 genera. In view of the whole-hearted way in which the Mammals of this District were worked over 70 years ago, by Sir W. Elliot, it is not surprising to find that there is nothing "new" in the present collection. This does not, however, detract from its great value, for it furnishes us with topotypes of no less than 8 species, named by Gray, &c., on specimens obtained by Elliot. These are as follows: (1) *Hipposideros fulvus*, Gray (=*murinus*, Gray=*fulgens*, Elliot=*murinus*, Elliot). (2) *Pachyura nigra*, Horsfield. (3) *Mus manei*, Gray (nom. nud.). (4) *Leggaad*

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

booduga, Gray (=*Mus lepidus*, Elliot). (5) *Epimys rufescens*, var.=*Mus rufus*, Elliot=*Mus flavescens*, Elliot (both names preoccupied). (6) *Millardia meltada*, Gray (=*Mus mutade*, Elliot=*Mus lanuginosus*, Elliot). (7) *Gunomys kok*, Gray (=*Mus* (*Neotoma*) *providens*, Elliot). (8) *Golunda ellioti*, Gray (=*Mus golundi*, Elliot=*Mus hirsutus*, Elliot).

Out of the list of 58 species (really 56 for *H. fulvus* and *Epimys rattus* are entered under two names) recorded by Sir W. Elliot, Mr. Shortridge has obtained 51; those not obtained are mostly large animals from the heavy forest country now forming the Kanara District. As Mr. Shortridge notes "four species mentioned by Sir W. Elliot, *viz.*, *Boselaphus tragocamelus*, *Cynœlurus jubatus*, *Canis pallipes* and *Hyœna hyœna* are now either entirely absent in the Dharwar District or rare stragglers south of Haidarabad."

Mr. Shortridge has taken a single specimen of the Common five-striped Squirrel (*Funambulus pennanti*) at Dharwar. This is somewhat of a surprise to me. I have taken it with the Palm Squirrel in Surat District, while Mr. Crump has sent them both from Nimar and Berar, and both occur in Bombay Island, so that we must, on the data available, accept 22° Lat. as about the northern boundary of *palmarum*. *F. pennanti* has been obtained by Capt. Whitehead at Sehore, by Mr. Caccia, I.F.S., at Hoshangabad and by the Society from Nasik, so that, until the present specimen turned up, the most southern record was about 20° N. Lat., and this is what one would expect, allowing for a slight overlap in the distribution of the two species. Perhaps some members who are favourably placed will push this enquiry further and report their results in the Journal. *F. palmarum* is at once recognisable by the bright red-yellow colouring of the under side of the tail and the presence of only three pale stripes on the back. In *F. pennanti* there are five pale stripes, though the outer one, on each side, is sometimes not very bright, and there is never any trace of colour on the under side of the tail.

In his List Sir W. Elliot includes *Mus decumanus*, unfortunately without any indication of its characters, so that it is impossible to say to what animal he was referring; that it was really the

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

European Brown Rat seems to me an absolute impossibility. From the vernacular name given by Elliot his *decumanus* was a house rat.

SIMIA SINICA, L.

The Bonnet Monkey.

1771. *Simia sinica*, Linnæus. Mantissa, p. 521.
1812. *Cercocebus radiatus*, Geoffroy. Ann. du Mus. XIX, p. 98.
1888. *Macacus sinicus*, Blanford. Mammalia, No. 10.
♂ 107, 109; ♀ 108, 110. Dharwar.
♂ 142; ♀ 143. Devikop, Dharwar.
♂ 749, 750; ♀ 751, 752, 753, 754. Samasgi, S. Dharwar.

Vernacular names.—Kóti, Kapi, Mangá, Maungyá, Kempmangá (Kanarese); Mákad Lál mangá (Marathi); Mángya-Kóti (Haran Shikaris and Waddars); Bandra (Dekhani).

["Very plentiful; often going about in large parties of from 20 to 30. Although said to avoid each other, I once saw troupes of these Monkeys and Langurs on the banks of a stream, apparently mixing together on quite friendly terms, but, when frightened, they went off separately.

"At Gadag, in the vicinity of Hindu Temples, where they are protected, they are said to have died, in large numbers, from Bubonic Plague."—G. C. S.]

PRESBYTIS HYPOLEUCOS, Blyth.

The Malabar Langur.

1841. *Semnopithecus hypoleucos*, Blyth. J.A.S.B., p. 839.
1842. *Semnopithecus dussumieri*, Is. Geoffroy. Comptes Reudus. XV, p. 719.
1888. *Semnopithecus hypoleucus*, Blanford. Mammalia, No. 15.
♂ 52; ♀ 47. Alnavar, Dharwar.
♂ 145, 146, 147, 183, 185; ♀ 148, 186. Devikop, Dharwar.
♂ 714, 717 juv.; ♀ 715, 716 juv. Hawsbhavi, S. Dharwar.
♂ 747, 748, 781, 791, 792; ♀ 744, 745, 746, 793. Samasgi, S. Dharwar.

This species was named by Blyth from the Malabar Coast; the present series seems to fit his description.

Vernacular names.—Mushya, Kari-Kóti, Adavi-Koti (Kanarese); Yerpa-Moti-Koti, Karimíkkamungyá (Waddars) Kari-Mangyá (Haran Shikaris) Wánga, Wánar, Maka (Marathi); Langúr (Dekhani).

["Extremely plentiful; generally fearless and inquisitive, easily distinguishing between Europeans and Natives, and much more suspicious in the presence of the former. When frightened they can crouch among the tops of thick trees, and by grasping and drawing branches together, become completely hidden."—G. C. S.]

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

PTEROPUS GIGANTEUS, Brünn.

The common Flying-Fox.

(Synonymy in No. 2.)

♂ 53, 55, 56, 57, 59, 60, 73 ; ♀ 54, 58, 72. Avatgi, Dharwar.

♀ 125, 126, 127, 128, 129, 130. Devikop, Dharwar.

♂ 707, 711, 719, 720; ♀ 577, 579, 580, 712 (in al.), 713. Hawsbhavi, S. Dharwar.

♂ 731. Honkan, S. Dharwar.

(*See* also Reports Nos. 2, 3 and 4.)

Vernacular names.—Togal-Bávali, Kíchapála, Bávali (Kanarese); Wadwágal (Marathi); Toggal-Bávali-Gua, Sikattélle (Waddars), Gaddal, Gíbta (Haran Shikaris).

["Very plentiful, around Dharwar, at this time of the year; they feed chiefly on tamarinds and wild figs.

"Appearing to avoid thick forests."—G. C. S.]

LYRODERMA LYRA, Geoffr.

The Indian Vampire Bat.

(Synonymy in No. 1.)

♂ 131, 133, 188, 194, 195 ; ♀ 132, 156, 160, 187, 189, 196, 197, 198, 199, 200, 201, 202, 203. Devikop, Dharwar.

♀ 732 (in al), 735. Honkan, S. Dharwar.

♀ 803. Hangal, S. Dharwar.

(*See* also Reports Nos. 1 and 2.)

These specimens, like those from E. Khandesh, come from the geographical boundary (about 76° E. Long.) between true *lyra* and the subspecies *caurina* which differs mainly in size. A very large proportion of the present series is undoubtedly true *lyra*, but, as was to be expected, there are some "wrong 'uns." One specimen has the dimensions of *caurina* and two are intermediate between it and true *lyra*.

["This bat, which is plentiful in both forest and Mulnad country, is a late flyer.

"I have found it by day in wells and old temples and once in a hollow tree."—G. C. S.]

MEGADERMA SPASMA TRIFOLIUM, Geoff.

The Malay Vampire Bat.

1810. *Megaderma trifolium*, Geoffroy. Ann. Mus. d'H.N. XV, p. 193.

1862. *Megaderma horsfieldi*, Blyth. Cat. Mamm., p. 23.

1891. *Megaderma spasma*, Blanford. Mammalia, No. 170.

♂ 739, 741 ; ♂ 738, 740 (in al.) juv., 742. Honkan, S. Dharwar

The true *spasma* is an inhabitant of the Moluccas and Philippines; the present form was first described from a specimen from Java.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

RHINOLOPHUS ROUXI, Temm.

The Rufous Horseshoe-Bat.

1835. *Rhinolophus rouxi*, Temminck. Mon. Mamm. II., p. 30 b.
1852. *Rhinolophus rubidus*, Kelaart. Prodr. Faun. Zeyl., p. 13.
1852. *Rhinolophus cinerascens*, Kelaart. l. c.
1852. *Rhinolophus rammanika*, Kelaart. l. c., p. 14.
1872. *Rhinolophus petersi*, Dobson. J. A. S. B. XLI (2), p. 337.
1891. *Rhinolophus affinis*, Blanford. Mammalia, No. 150.

♂ 135, 137, 139, 174, 177; ♀ 134, 136, 138, 140, 141, 178, 179, 180, 181. Devikop, Dharwar.

Blanford ranks *rouxi* as a synonym of *affinis*, but Dr. K. Andersen has pointed out (P. Z. S. 1905, p. 75 *et seq.*) that the form of the nose-leaf in the two is entirely different. In the same paper Dr. Andersen has gone fully into the name *petersi* and shown it to be a synonym of *rouxi*, and further has shown that Kelaart's three names represent the "colour phases" of one species and that one identical with *rouxi*.

Vernacular names (for all small bats.)—Kanakappadi, Kanakappate, Kankappate (Kanarese); Wágal (Marathi); Koptel, Sancípta (Waddars and Haran Shikaris).

["Plentiful at Devikop; a late flyer, roosting by day in hollow trees, wells and in old temples."—G. C. S.]

HIPPOSIDEROS DUKHUNENSIS, Sykes.

Sykes' leaf-nosed Bat.

1831. *Rhinolophus dukhunensis*, Sykes. P. Z. S., p. 99.
1838. *Hipposideros apiculatus*, Gray. Mag. Zool. Bot. II, p. 492.
1838. *Hipposideros penicillatus*, Gray. l. c.
1852. *Hipposideros templetonii*, Kelaart. Prod., p. 17.
1852. *Hipposideros aureus*, Kelaart. Prod., p. 18.
1852. *Hipposideros blythii*, Kelaart. Prod., p. 20.
1891. *Hipposiderus speoris*, Blanford. Mammalia, No. 164.

♂ 320, 321, 323, 324, 325, 326, 327, 328, 333, 358, 359; ♀ 317, 318, 319, 322, 329, 330, 331, 332, 334, 335, 336, 360, 361 (in al.), 343, 344, 345, 346, 347, 348, 349, 350. Gadag, Dharwar.

The name *speoris* was given by Schneider to a bat from Timor. I have seen no specimen from that locality, but both Sykes and Gray agree that the Indian form is separable. The names available are *dukhunensis*, Sykes, and *apiculatus* and *penicillatus*, Gray. These specimens are quite like the type of *apiculatus* of which they are topotypes. Though I have not seen an undoubted specimen of *dukhunensis*, its type locality is so close to Dharwar that, pending refutation, *dukhunensis* must be accepted as the proper name of the species.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

HIPPOSIDEROS FULVUS, Gray.

The bicoloured leaf-nosed Bat.

(Synonymy in No. 3.)

♀ 245. Dharwar.

♂ 446; ♀ 403, 447, 448, 449, 451, 452, 453, 454, 455, 456. Gadag, Dharwar.

These are topotypes of Elliot's *murinus* and *fulgens*, the latter being merely the red phase of the former, and equally so of Gray's *fulvus* and *murinus*.

(*See* also Report No. 3.)

PIPISTRELLUS CEYLONICUS, Kel.

Kelaart's Pipistrelle.

(Synonymy in No. 1.)

♂ 42, 44, 46, 77, 86, 87, 98, 386, 387, 389, 390, 392, 395, 398, 411; ♀ 41, 43, 45, 67, 83, 84, 85, 96, 97, 99, 246, 384, 385, 391, 393, 394, 396, 397, 399, 412. Dharwar.

(*See* also Reports Nos. 1, 2 and 3.)

["Very plentiful in a Hindu Temple at Gadag, hiding in crevices."—G.C.S.]

PIPISTRELLUS COROMANDRA, Gray.

The Coromandel Pipistrelle.

1838. *Scotophilus coromandra*, Gray. Mag. Zool. Bot. II, p. 498.

1851. *Vespertilio coromandelicus*, Blyth. J. A. S. B. XX, p. 159.

1853. *Myotis parvipes*, Blyth. J. A. S. B. XXII, p. 581.

1872. *Vesperugo micropus*, Hutton. P. Z. S., p. 707.

1891. *Vesperugo abramus*, Blanford. Mammalia No. 187.

♂ 703. Hawsbhavi, S. Dharwar.

♂ 775, 783; ♀ 773, 807, 808. Samasgi, S. Dharwar.

Temminck's names *imbricatus* and *abramus* refer to species found in Java and Japan respectively. Gray based his *coromandra* on the "Vespertilio de Coromandel" described by F. Cuvier from a specimen taken at Pondicheri. The names *parvipes* and *micropus* were both based on a Pipistrelle taken by Hutton at Masuri, it is quite possible it may prove to be distinct from the present form.

PIPISTRELLUS DORMERI, Dobs.

Dormer's Pipistrelle.

(Synonymy in No. 1.)

♂ 588. Hawsbhavi, S. Dharwar.

(*See* also Reports Nos. 1, 2 and 3.)

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

PIPISTRELLUS MIMUS, Wrought.

The Southern dwarf Pipistrelle.

(Synonymy in No. 1.)

♂ 218, 571 (in al.). Dharwar.

♀ 316 (in al.). Gadag, Dharwar.

♂ 589, 590, 591 ; ♀ 592, 721. Hawsbhavi, S. Dharwar.

(*See* also Reports Nos. 1, 2 and 3.)

HESPEROPTENUS TICKELLI, Blyth.

Tickell's Bat.

1857. *Nycticejus tickelli*, Blyth. J. A. S. B. XX, p. 157.

1857. *Nycticejus isabellinus*, Horsefield. Cat. Mamm., p. 38.

1891. *Vesperugo tickelli*, Blanford. Mammalia No. 191.

♂ 811, 812; ♀ 776, 798, 799, 805, 810. Samasgi, S. Dharwar.

Horsfield in his Catalogue gave the name *isabellinus* on the authority of a manuscript name of Blyth's, fortunately Blyth had already published the name *tickelli* before the Catalogue appeared. The two names therefore refer to the same animal whose type locality is Chaibasa "in Central India" (or more correctly Cuttack).

SCOTOPHILUS KUHLI, Leach.

The common yellow Bat.

(Synonymy in No. 1.)

♂ 17, 458 ; ♀ 34, 82. Dharwar.

♀ 772, 806. Samasgi, S. Dharwar.

(*See* also Reports 1 and 3.)

["Plentitul; an early flyer, coming out at the same time as *Pipistrellus*."—G. C. S.]

SCOTOPHILUS WROUGHTONI, Thos.

Wroughton's Bat.

(Synonymy in No. 1.)

♂ 217 ; ♀ 404. Dharwar.

(*See* also Report No. 1.)

TYLONYCTERIS PACHYPUS, Temm.

The club-footed Bat.

1840. *Vespertilio pachypus*, Temminck. Mon. Mamm. II, p. 217.

1859. *Scotophilus fulvidus*, Blyth. J. A. S. B. XXVIII, p. 293.

1891. *Vesperugo pachypus*, Blanford. Mammalia No. 180.

♀ 743. Honkan, S. Dharwar.

♀ 782. Samasgi, S. Dharwar.

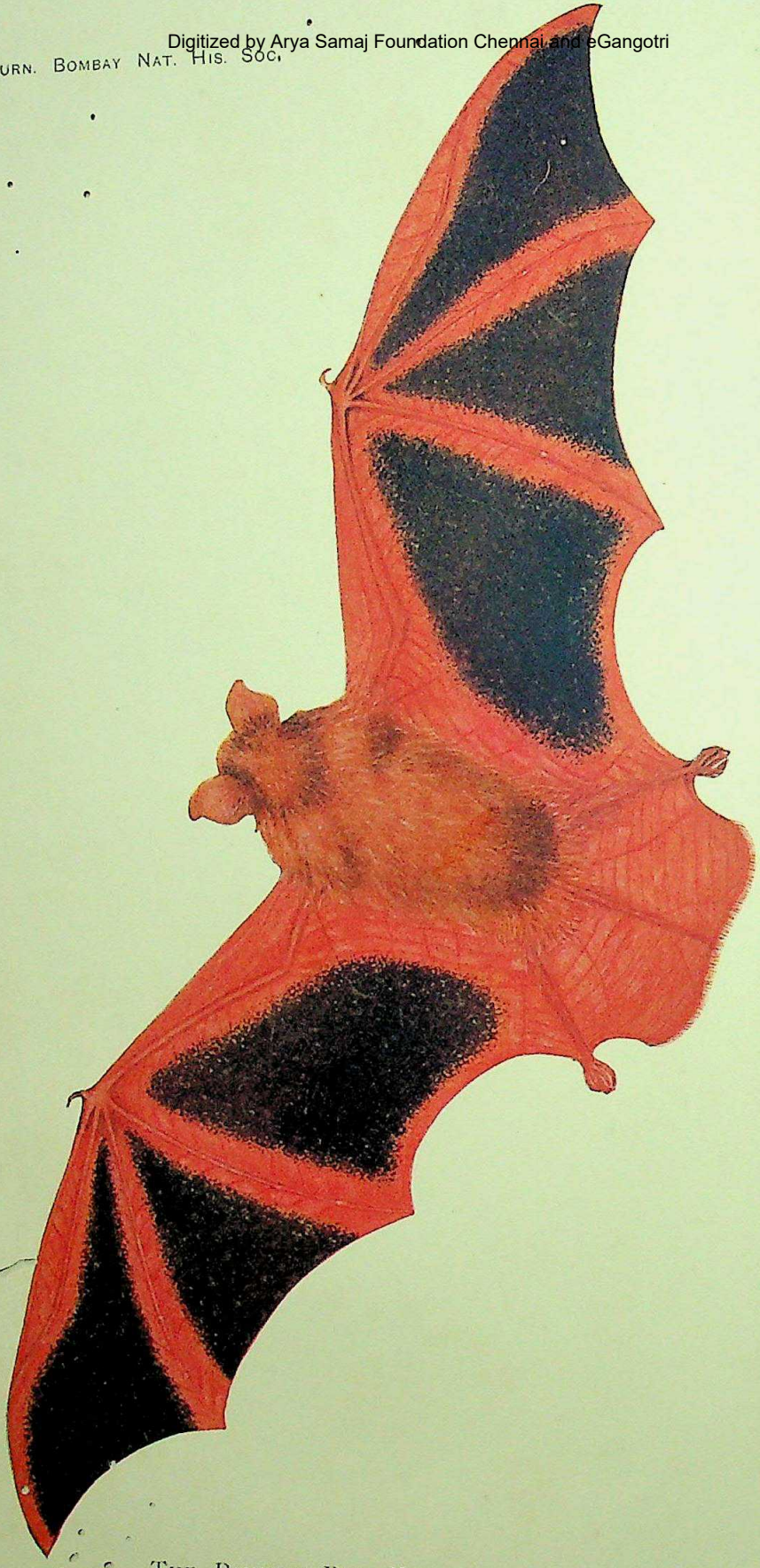
The type locality of *pachypus* is Java, while *fulvidus* was established by Blyth on a specimen from Tenasserim.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri



THE PAINTED BAT, KERIVOULA PICTA, PALLAS.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

KERIVOULA PICTA, Pall.

The painted Bat.

1767. *Vespertilio pictus*, Pallas. Spicil. Zool. III, p. 7.
1891. *Cerivoula picta*, Blanford. Mammalia No. 213.
♂ 11; ♀ 28. Dharwar.

The type came from Ternate in the Molucca Archipelago: the present specimens differ somewhat from the type, which is in the National Collection, but the material is not sufficient on which to base a strict diagnosis.

["Said to hide by day among thick foliage, clinging to the under side of leaves, where their bright colours would have a protective resemblance to dead leaves.

"Apparently very widely distributed, although somewhat rare everywhere.

"The brilliant orange of the wing membranes fades almost immediately after death. This colour seems to vary in shade in individuals from Java." —G.C.S.]

RHINOPOMA HARDWICKII, Gray.

The lesser Indian mouse-tailed Bat.

(Synonymy in No. 3.)
♂ 386, 369. 370, 373, 428; ♀ 357, 371, 372, 427. Gadag Dharwar.
(*See* also Report No. 3.)

["Fairly plentiful in old Hindu Temples at Gadag and Lakundi, sometimes found in company with *Hipposideros dukhunensis* although not in such large numbers. All were enormously fat, especially this species, in which it is manifested in the form of swellings at the root of the tail present in both sexes, but more particularly in the males. At certain times of the year these swellings are developed to such an extent as to interfere with the flight of the bats."—G.C.S.]

NYCTINOMUS TRAGATUS, Dobs.

Dobson's wrinkle-lipped Bat.

(Synonymy in No. 3.)
♀ 383. Gadag, Dharwar.
(*See* also Report No. 3.)

PACHYURA.

Shrews.

♂ 7, 19, 251, 286; ♀ 212, 287. Dharwar.
♂ 418, 442. Gadag, Dharwar.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

♂ 573; ♀ 574, 575, 598. Hawsbhavi, S. Dharwar.
♂ 727, 733; ♀ 734. Honkan, S. Dharwar.
(*See* also Reports 1, 3 and 4.)

Vernacular names.—Múgili, Sundili, Sondili, Chichikili (Kanarese); Chichandári (Marathi); Sóndi, Sondiyelka (Waddars and Haran Shikaris).

["Fairly plentiful around stables and outhouses, widely distributed, though apparently not in great numbers."—G.C.S.]

PACHYURA NIGRA, Horsf.

The Nilgiri Wood Shrew.

1851. *Sorex niger*, Horsfield. Cat. E. I. C. Mus., p. 135.
1888. *Crocidura murina*, Blanford. Mammalia No. 117 (partim).
♀ 220. Dharwar.

This is a topotype of Elliot's *Sorex niger* which was never published. Horsfield quoted it from Elliot's Manuscript and gave a short description; the name stands therefore on Horsfield's responsibility. Whether the name will stand for the species ultimately must be left for decision when more material is available, but for the present we are on firm ground in adopting for it the name *nigra*.

FELIS PARDUS, L.

The Panther.

1766. *Felis pardus*, Linnæus. Syst. Nat., p. 61.
1775. *Felis leopardus*, Wagner. Schreb. Saug. III, pl. ci.
1888. *Felis pardus*, Blanford. Mammalia, No. 30.
♂ 726. Hawsbhavi, S. Dharwar.
♀ 801. Samasgi, S. Dharwar.

Vernacular names.—Kiraba, Hongiya, Chirate, Chirchu, Sannhuli (Kanarese); Chíta-Wagh, Chíta-Bágh, Bíbta, Hasánya (Marathi); Kírrbah, Kurrkuda (Haran Shikaris); Chóta-Bágh, Théndwa (Dekhani).

FELIS AFFINIS, Gray.

The Jungle Cat.

(Synonymy in No. 1.)
♂ 78, 240, 469; ♀ 22, 224, 470, 471, 474. Dharwar.
(*See* also Reports Nos. 1, 3 and 4.)

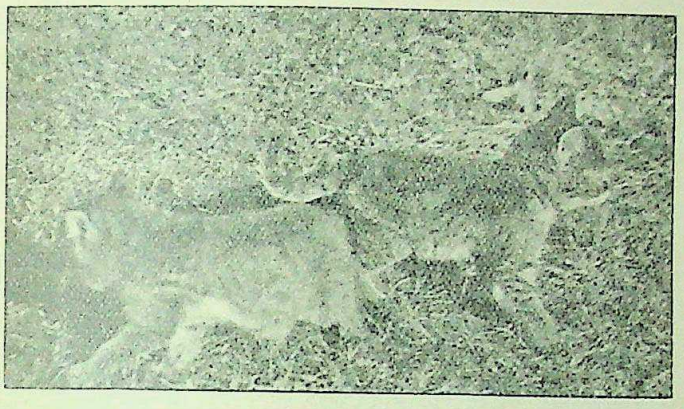
Vernacular names.—Kádubekku, Mántbekku, Adávibekku (Kanarese); Júngli Mániar (Marathi); Burakátchki (Haran Shikaris); Júngli-billi (Dekhani).

["Very plentiful; hunts a lot by day. Its long legs give it a very distinctive appearance, in the open its movements are very much like those of a small panther. Very swift and exceedingly strong for its size; it is probably capable of bringing down quite large game. Kittens become

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

tame quickly, although never to the same extent as those of a domestic cat. They become perfectly fearless, although remaining amusingly savage, especially at feeding time."—G. C. S.]



Kittens of the Jungle Cat.

FELIS RUBIGINOSA, Geoffr.

The rusty-spotted Cat.

1834. *Felis rubiginosa*, Is. Geoffroy. Belanger Voy. Ind. Or., p. 141.

1888. *Felis rubiginosa*, Blanford. Mammalia No. 37.

♂ 21. Dharwar.

Vernacular names.—Kiraba-Bekku (Kanarese); Ark-Phílli (Waddars).

["Apparently rare round Dharwar."—G. C. S.]

VIVERRICULA MALACCENSIS, Gmel.

The small Indian Civet.

(Synonymy in No. 3.)

♂ 79, 100, 285, 291, 472, 473; ♀ 8, 226, 241. Dharwar.

♂ 182. Devikop, Dharwar.

(*See* also Report 3.)

Vernacular names.—Punagina-Bekku (Kanarese); Jowádi-Mánjur (Marathi); Puluk-Phílli (Waddars); Punkassibekk (Haran Shikaris); Múshak-bílli (Dekhani).

["Plentiful; the large number of small carnivora around Dharwar may account for the comparative scarcity of hares and game birds, although their chief food probably consists of *Tatera* and the other field-rats, which exist in such enormous numbers."—G. C. S.]

MUNGOS MUNGO, Gmel.

The common Indian Mongoose.

(Synonymy in No. 1.)

♂ 9, 71, 476; ♀ 101, 102, 225, 475, 477, 482, Dharwar.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

♂ 648; ♀ 677. Hawsbhavi, S. Dharwar.

(*See* also Reports 1, 2, 3 and 4.)

Vernacular names.—Múngali, Mungili (Kanarese); Mungús (Marathi and Dekhani); Múngsi, Antúr (Waddars and Haran Shikaris).

["Plentiful; their burrows are frequently found in prickly pear thickets, numerous broken off spines of that plant being often found imbedded in their bodies. Although seldom leaving the ground, this species is a ood and agile tree climber."—G. C. S.]

PARADOXURUS NIGER, Desm.

The Indian Toddy Cat.

1820. *Viverra niyra*, Desmarest. Mamm., p. 208.
1820. *Viverra bondar*, de Blainville. Mamm., p. 210.
1821. *Paradoxurus typus*, F. Cuvier. Hist. Nat. Mamm., pl. 186.
1832. *Paradoxurus pennanti*, Gray. P. Z. S. p., 65.
1835. *Platyschista pallasii*, Otto. Ac. C. d. Nov. Act. XVII, p. 1089.
1891. *Paradoxurus nictitans*, Taylor. Jour. B. N. H. S., Vol. VI, p. 429.
1888. *Paradoxurus niger*, Blanford. Mammalia, No. 51.

♂ 50; ♀ 49, 51. Alnavar, Dharwar.
♀ 184, 242, 243, 247, 292. Dharwar.
♂ 708. Hawsbhavi, S. Dharwar.
♀ 768, 769. Samasgi, S. Dharwar.

This is a most puzzling species to deal with; it seems to have several colour forms but they are not also local forms, any or all of them may be found in any locality, including Zanzibar, Madagascar (?), Mauritius, &c., where they have been introduced. The only safe course is to call them all *niger*.

Vernacular names.—Kerabekku (Kanarese); Menuri (Marathi and Dekhani); Nulla-phílli (Waddars); Mahngutchi (Haran Shikaris).

["Plentiful, especially near houses, in the roofs of which they often live, and may be heard at night chasing rats. When caught young this animal becomes tame in a very short time."—G. C. S.]

CANIS INDICUS, Hodgs.

The Jackal.

(Synonymy in No. 1 under *C. aureus*.)

♂ 481; ♀ 284, 294, 484. Dharwar.

♂ 718 juv.; ♀ 608 juv. Hawsbhavi, S. Dharwar.

(*See* also Reports 1, 3 and 4).

Vernacular names.—Nari (Kanarese); Kóla (Marathi and Dekhani); Nákka, Tada Nákka (Waddars).

["Very plentiful both in open and forest country."—G. C. S.]

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

VULPES BENGALENSIS, Shaw.

The common Indian Fox.

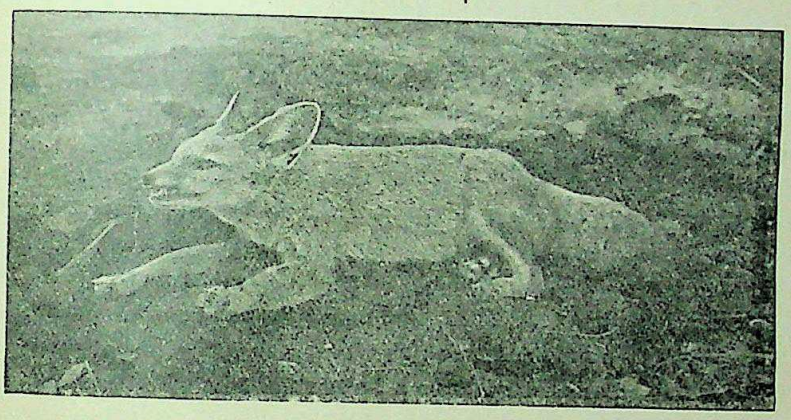
(Synonymy in No. 1.)

♂ 493; ♀ 68, 486. Dharwar.
♂ 122. Devikop, Dharwar.
♂ 311. Gadag, Dharwar.
♂ 609. Hawsbhavi, S. Dharwar.

(*See* also Reports Nos. 1 and 3.)

Vernacular names.—Kunní-Nari, Kemp-Nari, Kónk, Chándak-Nari (Kanarese); Lókri kókri (Marathi); Gúnta-Nakka (Waddars).

["Fairly plentiful, chiefly among rocky hills and broken country, often seen in the day-time. This fox is said to be difficult to hunt, except by sight, as it leaves a very slight scent."—G. C. S.]



The common Indian Fox from a photograph.

RATUFA INDICA, Erxl.

The Bombay Giant Squirrel.

1777. *Sciurus indicus*, Erxleben. Syst. Reg. An., p. 420.
1777. *Sciurus purpureus*, Ximmermann. Spec. Zool. Grog. Anad., p. 518.
1785. *Sciurus bombayannus*, Boddaert. Elench. An., p. 117.
1831. *Sciurus elphinstonei*, Sykes. P. Z. S., p. 103.
1891. *Sciurus indicus*, Blanford. Mammalia, No. 239 (partim).

♂ 150, 151, 158, 161, 164, 165, 166, 192; ♀ 149, 157, 163, 191. Devikop, Dharwar.

♂ 784, 786, 788, 789; ♀ 758, 759, 770, 778, 779, 780, 785, 787 Samasgi, S. Dharwar.

Blanford wrote on these squirrels in a paper in our Journal (Vol. XVI, p. 298) and later I dealt with them (Vol. XIX., p. 880.) These specimens are unmistakably *indicus*, which is curious for Mysore specimens, I believe, belong to another of Blanford's races.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Vernacular names.—Kadalale, Kempalale (Kanarese); Tambrikár (Marathi); Bet-urtá (Waddars and Haran Shikaris); Kargilheri, Jungli Gilheri (Dekhani).

["Plentiful in the Forests round Devikop and Samasgi. Very active and rather shy. Where abundant, it soon makes its presence known by it loud call; any sudden noise, such as hitting a tree sharply with a stick, will often start these squirrels calling in all directions.—" G. C. S.]

FUNAMBULUS PALMARUM, L.

The Palm Squirrel.

(Synonymy in No. 2.)

♂ 95, 103, 105; ♀ 6, 104, 106, 214, 250. Dharwar.

♂ 337, 338, 421; ♀ 420. Gadag, Dharwar.

♂ 646, 653, 654, 655; ♀ 611, 616, 661, 662, 687. Hawsbhavi S. Dharwar.

(*See* also Reports 2 and 4.)

Vernacular names.—Alale, Alalu, Inachi, Vúrchi (Kanarese); Kárzáni (Marathi); Úrta (Waddars and Haran Shikaris); Gilehri (Dekhani).

["Very plentiful, occurring everywhere except in the forest country where it is replaced by *F. tristriatus*. Particularly abundant in the neighbourhood of houses—sleeping in the roofs and spending the day in the verandahs and surrounding trees. Its call, which is a loud unmusical chatter, is uttered very frequently; when startled, angry, or in any way excited.

"They may often be found in prickly pear thickets, when their mouths are usually stained crimson with the juice of the fruit. Both this species and *tristriatus* feed also on the berries of the *Lantana*."—G. C. S.]

FUNAMBULUS TRISTRIATUS, Waterh.

The jungle Striped Squirrel.

1837. *Sciurus tristriatus*, Waterhouse. Charl. Mag. N. H. I, p. 499.

1667. *Sciurus* (*Tamias*) *dussumieri*, Milne-Edwards. Rev. Mag. Zool. XIX, p. 226.

1891. *Sciurus tristriatus*, Blanford. Mammalia, No. 254.

♀ 1, 2, 35. Dharwar.

♂ 206; ♀ 124, 176, 205. Devikop, Dharwar.

♂ 774, 777, 814, Skulls only, 794, 795, 796. Samasgi, S. Dharwar.

"Replaces *F. palmarum* in the forest part of the Mulnad. Its call however is distinct, being softer and much more musical."—G. C. S.]

FUNAMBULUS PENNANTI, Wrought.

The common five-striped Squirrel.

(Synonymy in No. 1.)

♂ 69. Dharwar.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

I was much astonished to find this animal in the collection. I was not aware that it came south of Bombay.

(*See* also Reports Nos. 1, 2, 3 and 4).

TATERA INDICA, Hardw.

The Indian Gerbil.

(Synonymy in No. 1.)

♂ 3, 61, 62, 118, 119, 215, 216, 221, 222, 228, 267, 268, 274, 277, 279, 280, 283, 288, 289, 290 ; ♀ 4, 5, 70, 88, 89, 116, 117, 232, 249, 269, 270, 273, 275, 276, 278, 281, 282, 293, 485. Dharwar.

♀ 152, 153, 154, 155, 159. Devikop, Dharwar.

♂ 307, 308, 340 ; ♀ 309, 310, 426. Gadag, Dharwar.

♂ 583, 585, 586, 600, 602, 606, 607 ; ♀ 582, 584, 587, 599, 601, 603. Hawsbhavi, S. Dharwar.

(*See* also Reports Nos. 1, 2, and 4.)

Vernacular names.—Ili (all rats, mice) ; Bilaili, Kádili, Buddílchi (Kanarese) ; Undir (Marathi) ; Yélka, Yerí-yélka, Ili Yélka (Waddars) ; Júngli-Choua (Dekhani).

["Plentiful everywhere, but most plentiful in red soil country near cultivation, where their rather large burrows are very noticeable, nocturnal. Always numerous among prickly pear thickets and hedges, when they frequently have their mouths and feet stained crimson with the juice of the fruit. Their speed and agility are remarkable."—G. C. S.]

VANDELEURIA OLERACEA, Benn.

The Dekhan Tree-Mouse.

(Synonymy in No. 2.)

♂ 27, 208, 209, 210, 211. Dharwar.

♀ 578. Hawsbhavi, S. Dharwar.

(*See* also Reports 2 and 4.)

Vernacular name.—Malkélka Meinélka (Waddars).

["Apparently not very plentiful around Dharwar. Four young, that were kept alive, were very active, and great climbers. When resting in a bush their tails would generally be curled round a branch."—G. C. S.]

MUS MANEI, Kel.

The common Indian House-Mouse.

1852. *Mus manei*, Kelaart. Prod., p. 64.

1891. *Mus musculus*, Blanford. Mammalia, No. 282 (partim).

♂ 231, 244 ; ♀ 15, 229, 230 (in al.), 252, 253, 254, 255, 256, 257, 258, 259. Dharwar.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

♂ 296, 298, 299, 341 (in al.), 406, 407, 408, 409, 410, 434, 435, 436; ♀ 297, 302, 342 (in al.), 405. Gadag, Dharwar.

These are topotypes of Gray's *Mus manei*. Unfortunately Gray published no description. In 1852 Kelaart applied the name to a Ceylon Mouse, whose description, as given by him, agrees quite closely with these specimens, except that the size quoted is rather small. Until specimens from Ceylon are available to show that they are distinct, I propose to use the name *manei* for the House-Mouse at any rate of Southern India. Kelaart points out that its longer tail, darker colour, and white toes differentiate it from *Mus musculus*.

["Particularly plentiful round Gadag. In the Dharwar District generally this species is not so generally distributed as *Epimys rufescens*. It appears to be quite absent in many villages and is never found at any distance from human habitations."—G. C. S.]

LEGGADA PLATYTHRIX, Sykes.

The Dekhan Spiny-Mouse.

(Synonymy in No. 1.)

♂ 13, 467, 468; ♀ 14, 30, 36, 37, 38, 39, 266, 271. Dharwar.

♀ 429. Gadag, Dharwar.

♂ 572, 597, 612, 623, 625, 627, 628, 649, 673, 674, 682; ♀ 596, 613, 614, 615, 624, 626, 629, 630, 650, 651, 675, 683, 686. Hawsbhavi, S. Dharwar.

♂ 728, 729. Honkan, S. Dharwar.

(*See* also Reports Nos. 1, 2 and 4.)

Vernacular names.—Léggádé (Waddars).

["Plentiful, often living among piles of loose stones or rocks. In open country it throws a collection of small stones round the entrance to its burrow, which recalls *Mus albocinereus* of the sandy districts of Western Australia, which constructs a small circular net work of sticks round its hole, to prevent sand from blowing in and choking it up. Elliot however notes that *Leggada platythrix* frequently closes the entrance to its burrow."—G. C. S.]

LEGGADA BOODUGA, Gray.

The Southern Field-Mouse.

(Synonymy in No. 1.)

♂ 12, 29, 31, 219, 227; ♀ 32, 33, (in al.), 264, 265. Dharwar.

♂ 315, 362, 376, 379, 419, 430, 432, 439, 440, 441, 443, 444, 445, 488, 497, 498; ♀ 377, 378, 400, 431, 433, 437, 438, 495, 496, 497, 499, 500, 501, 502, 503 (in al.), 489, 490. Gadag, Dharwar.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

♂ 595, 632, 658, 660, 709; ♀ 581, 656, 657, 693 (in al.), 633 to 645, 663, 665, 666, 667. Hawsbhavi, S. Dharwar.

The Dharwar specimens are topotypes of Gray's *booduga*, which was based on specimens sent by Elliot.

(*See* also Reports Nos. 1, 2 and 4.)

Vernacular names.—Budúga (Kanarese); Chíttagand, Chíttayelka (Waddars).

["Very plentiful everywhere, especially in cultivated country."—G. C. S.]

EPIMYS RUFESCENS, Gray.

The common Indian Rat.

♂ 20, 26, 114, 213; ♀ 113, 115, 121, 272. Dharwar.

♂ 112; ♀ 168, 169, 170. Devikop, Dharwar.

♂ 303, 306, 367; ♀ 300, 301, 304. Gadag, Dharwar.

♂ 460; ♀ 461. Hubli, Dharwar.

♂ 698. Hawsbhavi, S. Dharwar.

♂ 755, 763; ♀ 756, 757, 764. Samasgi, S. Dharwar.

VARIETY with white underparts.

♂ 16, 25, 120, 234, 235, 236, 237, 238, 239; ♀ 24, 111, 233. Dharwar.

♂ 459. Hubli, Dharwar.

♂ 576, 621, 622, 689, 691; ♀ 688, 690, 692, 723. Hawsbhavi, S. Dharwar.

♂ 765; ♀ 761, 762. Samasgi, Dharwar.

(*See* also Reports Nos. 1, 2, 3 and 4.)

Vernacular names.—Ili (all rats, Kanarese); Úndír (all rats, Marathi); Intyelka (Waddars); Chouá (all rats, Dekhani).

Hitherto all the specimens dealt with in these Reports have been uniformly characterised by dark underparts, whereas in this collection the majority are white below.

There has been at one time or another much discussion as to the taxonomic value of the belly colour in this very variable species.

Capt. Lloyd, I.M.S. (Records Ind. Mus. Vol. III, Part 1, page 92, 1909) writes: "White-bellied rats form a pure race in Rangoon; they are common in Calcutta. Out of 69 villages in the Punjaub it was found that only 3 contained them in small numbers." And again: "It cannot be doubted that the commonest type of *Mus rattus* in India is the dark-bellied one, and that the white-bellied type occurs sporadically." In the Malay Peninsula, Siam and the islands of the Malay Archipelago the dark-bellied type forms only an insignificant portion of the whole.

Two parallel forms occur in Egypt, and Mr. L. Bonhote has been carrying out breeding experiments with these. Some of his recent results

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

are recorded in P. Z. S., 1912, page 6: "With regard to the heredity of the two normal varieties, the white-bellied form (*M. r. tectorum*) was found to be apparently a simple Mendelian dominant to the dark-bellied form (*M. r. alexandrinus*), the dark-bellied ones always breeding true and the heterogeneous light-bellied ones giving a proportion of pure *alexandrinus*."

According to Mr. Bonhote's results there can be no "intermediates" (*i.e.*, in the outward appearance) between the dark-bellied and white-bellied forms. Amongst these Dharwar specimens in the large majority of white-bellied individuals the belly is pure white, marked off from dark back colour by a well defined line, but in one or two this sudden transition from dark to white is absent, and over more or less the whole of the under surface the bases of the hairs are grey.

Amongst the *Chiroptera* and especially amongst the *Rhinolophidæ* it is well known that colour "phases" constantly occur, and these perhaps are analogous to these forms of *rufescens*.

For the present I propose to list the white-bellied form merely as a "variety" of *rufescens*, as the course at once the safest and most convenient.

This white-bellied variety is undoubtedly the *rufus* and *flavescens* of Elliot, but both names are preoccupied; should a name be at any time required, *arboreus*, Buchanan Hamilton, is available and most apposite. Kelaart calls the corresponding animal in Ceylon "The white-bellied tree Rat."

Nos. 689, 690, 691, 692 above are representatives of the "sport" with a white spot on the forehead for which Capt. Lloyd has inadvertently established the name *brahminicus*; all four are quite young and evidently belong to the same litter.

MILLARDIA MELTADA, Gray.

The soft-furred Field-Rat.

(Synonymy in No. 1.)

♂ 10, 18, 40; ♀ 462 (in al.), 463, 464, 465, 466. Dharwar.

♂ 314, 339, 375, 401, 415, 416, 422, 424, 479, 480, 504; ♀ 374, 413, 414, 423, 425, 478, 487, 491, 492, 494 (in al.), 402. Gadag, Dharwar.

The Dharwar specimens are topotypes of Elliot's *M. lanuginosus* as well as of *Mus meltada*, Gray.

(*See* also Reports Nos. 1 and 3.)

Vernacular names.—Mettada, Mettad Illi (Kanarese); Mettanyélka, Mettad (Waddars).

["Confined, almost, if not entirely, to black soil country, where it is probably chiefly destructive to cotton crops. These rats, in favourable seasons, increase in such enormous numbers as to eat down the crops of an

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

entire district. While at Dharwar I never found the species so plentiful as *Tatera* or *Gunomys*, although there is no doubt that at times it becomes a plague."—G.C.S.]

GUNOMYS KOK, Gray.

The Southern Mole-Rat.

(Synonymy in No. 1.)

♂ 23, 66, 91, 260, 261; ♀ 63, 64, 65, 90, 92, 93, 262, 263. Dharwar.

♂ 173, 175; ♀ 162, 171, 172. Devikop, Dharwar.

♂ 351, 354, 355, 364, 380, 381, 382, 450; ♀ 305, 352, 353, 356, 363, 365, 366, 417. Gadag, Dharwar.

♂ 605; ♀ 604, 620, 685. Hawsbhavi, S. Dharwar.

(*See* also Reports 1 and 4.)

Vernacular names.—Kóka, Illkóka (Kanarese); Urpunigoóka (Haran Shikaris).

["Although not in quite such enormous numbers as *Tatera*, this species probably comes second here as a destroyer of crops. Occurs everywhere both in open cultivation, and the thickest forest; its existence being always indicated by the mole-hill like mounds which it throws up. They are extremely savage and when in confinement will jump at, and attempt to bite, anything that comes near them, at the same time giving a series of angry grunts."—G. C. S.]

BANDICOTA MALABARICA, Shaw.

The Malabar Bandicoot.

1801. *Mus malabaricus*, Shaw. Gen. Zool., p. 54.

1839. *Mus* (*Neotoma*) *giganteus*, Elliot. Madr. Jour. Land. S., p. 209.

1891. *Nesooia bandicota*, Blanford. Mammalia No. 296 (partim).

♂ 144, 190, 193; ♀ 167, 204. Devikop, Dharwar.

♀ 223. Dharwar.

♀ 760, 771, 813. Samasgi, S. Dharwar.

These certainly represent Elliot's *Neotoma gigantea*, but they seem most like the Travancore form. Compare my paper on the Bandicoots in this Journal (Vol. XVIII, p. 747).

Vernacular names.—Heggana (Kanarese); Ghús, Ghoús (Marathi and Dekhani); Phersakóka (Waddars).

["Chiefly frequenting stables and outhouses, where they are said to be very destructive in undermining floors. The habits of the Java Bandicoot were entirely different, it lived in rice fields and was fond of water.

This rat (as well as *Funambulus*, *Tatera* and even *Simia*) is said to be very liable to bubonic plague, and occasionally to be found dead in numbers from that cause.'—G. C. S.]

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

GOLUNDA ELLIOTI, Gray.

The Indian Bush Rat.

(Synonymy in No. 1.)

♂ 248. Dharwar.

♂ 593, 617, 619, 659, 664, 669, 671, 676, 680, 694, 700, 701, 702, 710 ; ♀ 594, 610, 618, 631, 652, 668, 669, 670, 672, 678, 679, 681, 684, 695, 696, 697, 699, 704, 705 (in al.). Hawsbhavi, S. Dharwar.

♂ 766; ♀ 767. Samasgi, S. Dharwar.

(*See* also Report No. 1.)

Vernacular names.—Gulanda (Kanarese); Serrumgúnda Gulandélka (Waddars).

These are topotypes of Gray's species, later ; in his Dharwar List, Elliot named it *hirsutus*.

HYSTRIX LEUCURA, Sykes.

The Indian Porcupine.

(Synonymy in No. 1.)

76 (skull only). Dharwar.

(*See* also Report No. 1.)

Vernacular names.—Mulluhani, Yédu (Kanarese); Sáial, Sáyler (Marathi and Dekhani); Yetundi, Yédu (Waddars and Haran Shikaris).

["Not plentiful round Dharwar."—G. C. S.]

LEPUS NIGRICOLLIS, Cuv.

The black-naped Hare.

1807. *Lepus hurgosa*, Buchanan. Voy. Mysore i., p. 169 (nomen nudum).

1823. *Lepus nigricollis*, F. Cuvier. Dict. Sc. Nat. XXVI, p. 307.

1843. *Lepus kurgosa*, Gray. Cat. Mamm. (nomen nudum).

1891. *Lepus nigricollis*, Blanford. Mammalia No. 319.

♀ 48. Alnawar, Dharwar.

♂ 75, 81 (imm.); 94. ; ♀ 74, 80. Dharwar.

♂ 123; ♀ 207. Devikop, Dharwar.

♂ 312, 313, 388; ♀ 457. Gadag, Dharwar.

♀ 647. Hawsbhavi, S. Dharwar.

♀ 730. Honkan, S. Dharwar.

♀ 790, 804 (in all.) Samasgi, S. Dharwar.

The type locality of this species is Malabar. It is also found in Java (introduced). The material is very scanty on which to judge, but the Nilgiri form seems to vary from this one and when specimens are available from Malabar for comparison both may be found to differ from true *nigricollis*.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Vernacular names.—Mola, Mala (Kanarese); Sasá (Marathi); Kundéli (Waddars and Haran Shikaris); Khargosh (Dekhani).

["Occurring both in open and forest country. Chiefly, but not exclusively, nocturnal. Two young ones born in captivity, in early November, had their eyes open and were just able to move about within 12 hours. This hare is rather savage, and when caught will often attempt to bite, and to scratch with its fore paws, frequently uttering loud squeals. If two are confined together, one will generally fight with and kill the other."—G.C.S.]

RUSA UNICOLOR, Bechs.

The Sambhar.

1799. *Cervus unicolor*, Bechstein. Allgeui. Uebers. Vierfus. i., p. 112.
1823. *Cervus hippelaphus*, Cuvier. Oss. Foss. ed. 2. N., p. 40.
1823. *Cervus equinus*, Cuvier. l. c., p. 45.
1825. *Cervus aristotelis*, Cuvier. Oss. Foss. ed. 3, iv., p. 503.
1825. *Cervus leschenaulti*, Cuvier. l. c., p. 506.
1831. *Cervus jarai*, Hodgson. Glean. Sc. iii., p. 321.
1843. *Axis pennantii*, Gray. List Mamm. B.M., p. 180.
1891. *Cervus unicolor*, Blanford. Mammalia No. 367.

♂ 295 (imm). Dharwar.

Vernacular names.—Kadave, Kadaba (Kanarese); Méru, Sámbar (Marathi); Sámbar (Dekhani).

AXIS AXIS, Erxl.

The Spotted Deer.

1777. *Cervus axis*, Erxl. Syst. Reg. An., p. 312.
1831. *Cervus nudipalpebra*, Ogilby. P.Z.S., p. 136.
1841. *Axis major* and *minor*, Hodgson. S.A.S.B., x, p. 914.
1843. *Axis maculata*, Gray. List. Mam. B.M., p. 178.
1891. *Cervus axis*, Blanford. Mammalia No. 368.

802 ♀. Samasgi, S. Dharwar.

Vernacular names.—Sáraga, Sáranga (Kanarese and Waddars); Chital, Chithal, Mirg (all kinds of deer, Marathi and Dekhani); Kárdoh, Saringi (Haran Shikaris).

ANTILOPE CERVICAPRA, L.

The Black Buck.

1766. *Capra cervicapra*, Linnæus. Syst. Nat., p. 96.
1850. *Antilope bezoartica*, Gray. P.Z.S., p. 117.
1891. *Antilope cervicapra*, Blanford. Mammalia No. 357.

♂ 483. Hebli near Dharwar.

♂ 722, 724 (Skull only), 725; ♀ 706. Hawsbhavi, S. Dharwar.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Vernacular names.—Chigari (Kanarese); Hàran, Krishnámrig (Marathi); Háran, Kalwít (Dekhani); Gínka (Waddars and Haran Shikaris).

["Not occurring in the immediate vicinity of Dharwar, but in the black cotton soil districts that stretch away to the north-east and south-east they are widely distributed and in many places sufficiently numerous to do a considerable amount of damage to the cotton crops. The does and immature bucks have a considerable resemblance to the Spring Buck of South Africa, and their habits are similar in many ways. But there is something stilted and stiff jointed about the movements of a Black Buck which is quite unlike a Spring Buck, which I consider the more graceful and certainly the swifter of the two."—G.C.S.]

GAZELLA BENNETTI.

The Indian Gazelle.

(For Synonymy, *see* Report No. 1.)

♂ (imm.) 1357. Near Haveri, Dharwar.

(*See* also Reports Nos. 1 and 3.)

Vernacular names.—Channachigari, Burari Kúngur (Kanarese); Chínkárá (Marathi and Dekhani).

TETRACEROS QUADRICORNIS, Blainv.

The four-horned Antelope.

(For Synonymy, *see* Report No. 2.)

♂ 800. Samasgi, S. Dharwar.

(*See* also Report No. 2.)

Vernacular names.—Kónd-kuri, Kan-kuri (Kanarese); Jángli-Békra (Marathi and Dekhani); these names are also used for *M. vaginalis* the Muntjac.

SUS CRISTATUS, Wagn.

The Indian Wild Boar.

1839. *Sus cristatus*, Wagner. Munch. Gel. Anz. ix., p. 435.
1843. *Sus indicus*, Gray. Cat. Mamm. (no description).
1847. *Sus affinis*, Gray. Cat. Ost. Spec, p. 71.
1860. *Sus indicus*, Blyth. J.A.S.B., xxix, p. 105.
1891. *Sus cristatus*, Blanford. Mammalia No. 374.

♀ 736, 375, Honkan, S. Dharwar.

Vernacular names.—Handi, Karimikka (Kanarese); Dúkar (Marathi); Fúndi (Waddars); Pandi (Haran Shikaris); Suar, Bura Jánwar (Dekhani).

Blanford points out, though he does not accept, Blyth's separation of three forms, under separate names, of the Indian Wild Pig. Blyth accepts the Malabar form as true *cristatus* and separates the trans Gangetic pig as *bengalensis* on account of the less marked constriction of the parietal and

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

the shorter tail. Blanford distinguishes *cristatus* from the European *scrofa* by the great size and complexity of its posterior molar. The material in the Museum is very scanty but in three adult or old Boars (from Malabar, Sind and 'India') I find that the parietal constriction measures from 28 to 34 mm., the posterior molar 43, and the next two together 35 mm., while in three animals (from Sikhim and the Tarai) these measurements average 46, 37 and 35 mm. respectively.

The question does not directly affect this report for the present specimens are undoubtedly *cristatus*, but I would suggest that the Society start a record of measurements of Indian Pigs. If a direct appeal were made to the Secretaries there should be no difficulty in obtaining body measurements from various Clubs, and the loan or gift of skulls for the desired measurements.

[The coloured plate of the Painted Bat *Kerivoula picta* which accompanies this paper gives a very good idea of the brilliant colouring of this bat.

The red of the wings is very faithfully reproduced but the fur on the head has hardly been made long enough which makes the ears appear to stand out more than they do in life. No one who has not seen this bat alive or a short time after death can have any idea of the beautiful colouring as it rapidly fades after death and in museum specimens the wings appear a parchment yellow.—EDS.]

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

A LIST OF BIRDS FROM ARAKAN.

BY

CYRIL HOPWOOD, I.F.S.

Before attempting to deal with the birds met with during my two years' stay in Arakan, perhaps I may be permitted to give a brief description of the district itself, as I feel that this may prove of interest to those unacquainted with this corner of the Indian Empire, and help to explain the presence or absence of certain birds.

Arakan may be divided roughly into three belts. (i) The sea coast, (ii) the foot hills and (iii) the main hill ranges. With regard to (i) a considerable portion of the coast line is fringed with mangrove swamp, in which kingfishers, storks, herons and a few raptorial and passerine birds are found; but there are, in places, considerable areas of sandy beach, backed by open grassy downs, which are a favourite haunt of the small waders, and especially of the Eastern Golden Plover, which is found here in thousands. Between the sea coast and the foot hills lies the paddy land, which is of very considerable extent; this tract is of more interest to the sportsman than to the ornithologist, as there are few birds to be seen (other than the very commonest), except snipe and duck, though the latter are not too numerous, on account of the scarcity of suitable jheels.

Passing over (ii) for the moment, it may be stated roughly that practically the whole of (iii) is dense bamboo jungle, almost treeless, and consequently unsuitable for a great variety of bird life. The exception is the Kyaukpaudaung range, which reaches an elevation of about 4,000 feet. This range, which I was lucky enough to visit for a few days in May 1909, is a veritable ornithologist's paradise, and my only regret was that my time there was so limited. At a height of about 3,000 feet the bamboo gives place to very fine evergreen jungle, and at the top of the range there are numerous open grassy glades. As the birds met with here will be dealt with in their proper order, it is unnecessary to remark upon them at this point.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

From the foregoing, it follows that the bulk of the passerine birds are to be met with in the foot hills (ii) and the forest growth may be described as mainly of the deciduous type, fairly open, and without much undergrowth. The streams, however, many of which are perennial, are frequently fringed with dense evergreen jungle including palms and canes and the foot hills thus afford a very considerable variety of forest eminently suited to the requirements of passerine and raptorial birds. Further, as there is a good deal of paddy cultivation lying between the lower spurs, there is an additional attraction for such birds as find their food amongst the standing grain and stubbles. In conclusion, I must apologise for the meagreness of my list; and in extenuation would plead guilty to being an oologist rather than an ornithologist; this, added to the extreme difficulty of transporting specimens, accounts for my having undoubtedly passed over large numbers of the smaller passeres, especially warblers, though so far as possible, I made a point of shooting any small bird with which I was unacquainted.

The numbers used are from the "Fauna of British India."

ORDER PASSERES.

Family Corvidæ.

4. Corvus macrorhynchus.—The Jungle Crow.

Common on sea coast and in foot hills; frequently found feeding on garbage on the beach. I found two nests on 27th March 1909, each with three young, nearly fully fledged.

7. Corvus splendens.—The Indian House Crow.

The only house crow found at Akyab and to the north; to the south it extends as far as Kyaukpyu (some 60 miles south of Akyab), where it is found in company with *C. insolens*.

South of Kyaukpyu I failed to meet with it. It is of interest to note that it commences breeding at the end of February, and nests with eggs are numerous by the first week in March. It is much victimised by the Koel, of whom more anon. On 2nd March 1909, I obtained two very abnormal pale blue eggs, with a few large blotches, rather recalling the eggs of the talking Myna (*E. intermedia*), but quite rough to the touch, and glossless.

8. Corvus insolens.—The Burmese House Crow.

Found with *C. splendens* at Kyaukpyu, but not further north. South of

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Kyaukpyu it replaces *C. splendens*. I did not look for nests, but doubtless it breeds in March.

12. Urocissa occipitalis.—The Red-billed Blue Magpie.

Foot hills of Arakan Yoma, but rare.

14. Cissa chinensis.—The Green Magpie.

I only met with the bird once myself, in March 1910, when beating for pig. The only other occasion on which I heard of it was from my friend Mr. Hamilton, of the Forest service, who tells me that when he was sitting up over a corpse for a man-eater, one of these birds came and pecked at the corpse; but whether it was devouring the flesh or searching for insects is uncertain. The incident, however, seems worthy of note. The bird would appear to be rare, as I did not meet with it at Kyaukpaudaung.

16. Dendrocitta rufa.—The Indian Tree-Pie.

Common, especially at Akyab, where it breeds in April and May, though I failed to find its nest.

31. Parus atriceps.—The Indian Grey Tit.

I think I saw some of these birds on Kyaukpaudaung, but failed to obtain a specimen. As its range extends throughout Burma it is fairly certain that it occurs in Arakan.

I met with no other birds which I even suspected of belonging to the *Parinæ* or *Paradoxornithinæ*. The country, on the whole, is unsuitable for these birds, and if any occur they must be very rare and local.

Family Crateropodidæ.

69. Garrulax leucolophus.—The Himalayan White-Crested Laughing Thrush.

Fairly common. I got a nest with 4 eggs on 8th May 1909 on Kyaukpaudaung. I failed to meet with *G. belangeri* at all.

72. Garrulax pectoralis.—Black-gorgeted Laughing Thrush.

Common. I saw a partial albino of this species, but failed to secure it.

73. Garrulax moniliger.—The Necklaced Laughing Thrush.

Less common than the preceding.

116. Pomatorhinus schisticeps.—The Slaty-headed Scimitar Babbler.

Fairly common, and one of the few birds which inhabits the heavy bamboo jungle.

131. Pomatorhinus hypoleucus.—The Arakan Scimitar Babbler.

Not common, and appears to inhabit the dense bamboo forest. I was fortunate enough to obtain a nest with 2 eggs on 26th January 1909. The nest was of the usual type, and placed in a fork of a bamboo. It was made of the twigs and tendrils of a creeper, and thickly lined with roots and fibres of fern. It measured 13 inches from top of dome to base and 7 inches from entrance, which was at the side to back.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

134. TIMELIA PILEATA.—The Red-capped Babbler.

Far from common, but occurs occasionally in scrub jungle, usually near the sea.

137. GAMPSORHYNCHUS RUFULUS.—The White-headed Shrike-Babbler.

I only once met with these birds, and that was in dense bamboo jungle at the foot of the Sandway Yoma. I secured one immature specimen.

139. PYCTORHIS SINENSIS.—The Yellow-eyed Babbler.

Not uncommon in scrub jungle near the sea coast; resident and breeds.

143. PELLORNEUM MINUS.—Sharpe's Spotted Babbler.

Mr. Oates was good enough to identify my specimen, whose nest I found on Kyaukpaudaung on May 10th, 1909, with 3 eggs. The bird is not uncommon; all the specimens I obtained were similar to that sent to Mr. Oates, so I fancy that *P. subochraceum* does not occur in Arakan.

153. CORYTHOCICHLA STRIATA.—The Streaked Babbler.

I record this with some diffidence, as the bird was severely damaged by the shot, and could not be preserved; but it appeared, after careful examination, to be referable to this species. It was one of a pair, which appeared to be breeding, though I could not find the nest, and was obtained on Kyaukpaudaung on May 9th, 1909.

160. TURDINUS ABBOTTI.—Abbot's Babbler.

Not uncommon in evergreen jungle.

163. ALCIPPE NEPALENSIS.—Nepal Babbler.

On Kyaukpaudaung, where I found a nest on May 10th, 1909. I failed to meet with the bird elsewhere, or with *A. phayrii*.

169. STACHYRHIS NIGRICEPS.—The Black-throated Babbler.

Not uncommon. Nest with 4 eggs on Kyaukpaudaung on 8th May 1909.

188. MYIOPHONEUS EUGENII.—The Burmese Whistling Thrush.

Not common.

Other members of the *Brachypteryginæ* and of the *Sibiinæ* are likely to occur on Kyaukpaudaung, but I should not expect to find them elsewhere.

243. ÆGITHINA TIPHIA.—The Common Iora.

Common everywhere.

247. CHLOROPSIS AURIFRONS.—The Gold-fronted Chloropsis.

Fairly common.

250. CHLOROPSIS CHLOROCEPHALA.—The Burmese Chloropsis.

Common.

254. IRENA PUELLA.—The Fairy Blue Bird.

Rather rare; but breeds, as I shot a female on April 8th, 1909, which would have laid in a few days time.

255. MELANOCHLORA SULTANEA.—The Sultan Bird.

A single specimen, probably breeding, on Kyaukpaudaung, May 1909.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Sub-family Brachypodinæ.

263. Criniger flaveolus.—The White-throated Bulbul.

I believe this to be the common Criniger of Arakan. I have undoubted specimens of this bird, but none of *C. burmanicus*. The birds are common, but difficult to shoot.

269. Hypsipetes psaroides.—Himalayan Black Bulbul.

Very common on Kyaukpaudaung, where I got numerous nests in May 1909; but I did not see it elsewhere. I failed to meet with *H. concolor*.

272. Hemixus flavala.—The Brown-eared Bulbul.

Kyaukpaudaung, but not elsewhere.

275. Hemixus macclellandi.—Rufous-bellied Bulbul.

Kyaukpaudaung, not elsewhere.

279. Molpastes burmanicus.—Burmese Red-vented Bulbul.

Common everywhere.

287. Xanthixus flavescens.—Blyth's Bulbul.

Mr. Oates identified two specimens from Kyaukpaudaung, where they are common. They are smaller than the type specimens, but this Mr. Oates attributes to their being young birds. However, I shot adults which were no larger, and I am inclined to think that this is a small local race; there is no reason to consider it a different species.

288. Otocampsa emeria.—Bengal Red-whiskered Bulbul.

Common everywhere.

290. Otocampsa flaviventris.—Black-crested yellow Bulbul.

Common. I saw a pair collecting nesting materials in March 1910; but I have never found a nest.

306. Pycnonotus blanfordi.—Blanford's Bulbul.

Very rare in Arakan, the country being unsuited to its habits; but occurs occasionally.

310. Micropus melanocephalus.—The Black-headed Bulbul.

I obtained a single specimen on 2nd March 1909, near the Akyab race-course. I searched for a nest, but was not successful.

Family Sittidæ.

325. Sitta frontalis.—Velvet-fronted Blue Nuthatch.

This bird is very fairly common, and appears to be the only nuthatch commonly found in Arakan. *S. neglecta* was not met with.

Family Dicruridæ.

327. Dicrurus ater.—The Black Drongo.

Common.

333. Dicrurus cineraceus.—The Grey Drongo.

I saw, but failed to secure a species of Grey Drongo on several occasions. I feel almost certain that these birds were *D. cineraceus*.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

335. CHIBIA HOTTENTOTTA.—The Hair-crested Drongo.

Common everywhere. I have seen flocks of 40 or 50 together. On one occasion they were dashing into the water from an overhanging tree, flying back, and repeating the performance; they seemed to be bathing or playing, not feeding.

339. BHRINGA REMIFER.—Lesser Racket-tailed Drongo.

Fairly common.

340. DISSEMURUS PARADISEUS.—Larger Racket-tailed Drongo.

Common throughout the foot hills, and along the larger streams. I found several nests, but was unable to get at them. Curiously enough I obtained two nests quite easily accessible, in mango trees, near Rangoon shortly after I left Arakan. The tail feathers of this bird, and of *B. remifer*, are much sought after for use as head-dresses by the Chin hill-tribes.

FAMILY CERTHIIDÆ.

I failed to identify any species, but once or twice I saw a wren, probably a species of *Pnoepyga*.

FAMILY SYLVIIDÆ.

As already stated, I know that I missed many warblers; the appended list is therefore very meagre, and far from representative.

363. ACROCEPHALUS STENTOREUS.—Indian Great Reed Warbler. Obtained a single specimen on 28th March 1910.

367. ACROCEPHALUS AGRICOLA.—Paddy-field Reed Warbler.

I got a bird on 9th February 1909, which I identified as this species, but unfortunately the bird went bad before I had time to skin it, so I was unable to have my opinion corroborated.

374. ORTHOTOMUS SUTORIUS.—Tailor-bird.

Very common. Nests abundantly in May.

379. CISTICOLA TYTLERI.—Yellow-headed Fantail Warbler.

Identified for me by Mr. Oates. Cisticolas are very common in suitable localities, but I failed to actually identify any other species. I found no nests.

382. FRANKLINIA GRACILIS.—Franklin's Wren-Warbler.

Appears common. Numerous nests were obtained by my friend, Mr. Thorn, near Paletwa in N. Arakan.

424. ACANTHOPNEUSTE MAGNIROSTRIS.—Large-billed Willow-Warbler.

I record this species with some diffidence, as the single specimen obtained was moulting, and was damaged by the shot. But it was without doubt an *Acanthopneuste*; and judging by the dark colour, attributable to this species. Date 12th April 1910.

463. PRINIA FLAVIVENTRIS.—Yellow-bellied Wren-Warbler.

Common and breeds.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

468. PRINIA BLANFORDI.—Burmese Wren-Warbler.

I cannot swear to the species, but it is either this or *P. inornata*. Not common.

FAMILY LANIIDÆ.

474. LANIUS COLLURIOIDES.—The Burmese Shrike.

Common in the winter. Leaves about April, and first seen on return on October 3rd, 1909.

481. LANIUS CRISTATUS.—Brown Shrike.

Very common near the sea coast from August to April. Mr. Oates identified the bird for me, but it was not quite typical. I much regret not having collected a series, though I see no reason for suspecting the occurrence of a new species. But it is just possible.

484. HEMIPUS PICATUS.—Black-backed Pied Shrike.

I several times saw birds which I presume belonged to this species, and shot and identified one on 20th March 1910.

488. TEPHRODORNIS PONDICERIANUS.—Common Wood Shrike.

Common in suitable localities. I failed to obtain any other species of *Tephrodornis*.

491. PERICROCOTUS FRATERCULUS.—Burmese Scarlet Minivet.

I did not actually obtain a specimen, as the birds were very rare, but I presume the few seen were of this species.

500. PERICROCOTUS PEREGRINUS.—Small Minivet.

Common. Breed in the Casuarina trees in Akyab cantonments.

510. GRAUCULUS MACII.—Large Cuckoo Shrike.

Very common and noisy. I was lucky enough to get a nest, with two nearly fresh eggs on 30th March 1909, to which I was attracted by the agitation of the birds. It was only when my man climbed the tree that the nest was discovered, as it was almost invisible from below, being most cunningly concealed in a forked branch.

512. ARTAMUS FUSCUS.—Ashy Swallow Shrike.

Very common. Breeds about April in the Casuarinas in Akyab.

FAMILY ORIOLIDÆ.

521. ORIOLUS MELANOCEPHALUS.—Indian Black-headed Oriole.

Common everywhere.

FAMILY EULABETIDÆ.

524. EULABES INTERMEDIA.—Indian Grackle.

Not very common. Obtained eggs in N. Arakan in May. As elsewhere, a favourite cage bird. One of a pair which I had in my aviary was a brilliant talker and mimic, and could also whistle tunes.

FAMILY STURNIDÆ.

538. STURNIA MALABARICA.—The Grey-headed Myna.

Common. Breeds in holes in the Casuarinas in April and May in Akyab.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

549. ACRIDOTHERES TRISTIS.—Common House Myna.

Common everywhere.

552. ŒTHIOPSAR FUSCUS.—The Jungle Myna.

Common in all suitable localities, but I failed to find a nest.

556. STURNOPASTOR SUPERCILIARIS.—Burmese Pied Myna.

Very common and breeds in large numbers near towns and villages in May. Mr. Oates writes under *S. contra*: "A specimen from Arakan in the British Museum is a typical *S. contra*." Every single bird which I met with, and I shot some dozens, and examined many more through glasses at close range were typical *S. superciliaris*. The British Museum specimen must, therefore, have been a rare straggler.

FAMILY MUSCICAPIDÆ.

Flycatchers are scarcely as numerous as might be expected, and I failed to meet with several usually common species. I am inclined to think that I did not overlook many, as I take a rather particular interest in this family.

558. HEMICHELIDON SIBIRICA.—Sooty Fly-catcher.

Apparently confined to Kyaukpaudaung, where I obtained a specimen on May 7th, 1909. From the date, I should judge it to be resident.

562. SIPHIA ALBICILLA.—Eastern Red-breasted Fly-catcher.

Common winter migrant approximately from November to March. All in female dress.

569. CYORNIS MELANOLEUCUS.—Little Pied Fly-catcher.

Common in Kyaukpaudaung at about 4,000 feet, not seen elsewhere.

575. CYORNIS RUBECULOIDES.—Blue-throated Fly-catcher.

Appears common.

592. CULICICAPA CEYLONENSIS.—Grey-headed Fly-catcher.

Common.

594. NILTAVA SUNDARA.—Rufous-bellied Niltava.

Though several times seen, I failed to shoot a specimen; but I am well acquainted with the bird which I obtained in the Upper Chindwin, not a great distance from Arakan as the crow (or Niltava!) flies, so I think it may safely be recorded.

599. TERPSIPHONE AFFINIS.—Burmese Paradise Fly-catcher.

Fairly common in suitable localities. I got a nest from an evergreen stream with two fresh eggs on 13th April 1909. The nest was placed in the angle between the stem and leaf of a wild canna. Cock bird in chestnut plumage.

605. RHIPIDURA ALBICOLLIS.—White-throated Fantail Fly-cather.

Not common. One of the birds which haunts the gloomy bamboo forests of the Yoma, where I first observed it.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

FAMILY TURDIDÆ.

608. PRATINCOLA CAPRATA.—Common Pied Bush Chat.

Common and breeds.

610. PRATINCOLA MAURA.—Indian Bush Chat.

Common winter migrant.

631. HENICURUS GUTTATUS.—Eastern Spotted Forktail.

On Kyaukpaudaung only. I obtained a nest of the usual Forktail type with three fresh eggs on May 8th, 1909. The nest was in a cleft of a rock over water.

633. HENICURUS IMMACULATUS.

Common along all jungle streams, and occasionally seen in Akyab cantonments. Breeds March and April.

638. CHIMARRHORNIS LEUCOCEPHALUS.—White-capped Redstart.

Not common, but occasionally met with near waterfalls in perennial streams. Probably breeds, as I have seen it as late as April.

646. RHYACORNIS FULIGINOSUS.—Plumbeous Redstart.

A single female. N. Arakan. Cold weather.

663. COPSYCHUS SAULARIS.—Magpie-Robin.

Common.

664. CITTOCINCLA MACRURA.—Shama.

Not common.

686. GEOCICHLA CITRINA.—Orange-headed Ground Thrush.

Only met with on Kyaukpaudaung, in evergreen jungle at about 4,000 feet. I got three nests on May 8th and 9th, 1909, containing respectively 1 fresh, 3 slightly incubated and 2 hard set eggs. The nests were of the usual type, placed in the fork of a sapling in each case.

693. PETROPHILA CYANUS.—Western Blue Rock Thrush.

Common from October to about April. A few arrive in September. This bird occasionally sings most beautifully but very rarely.

698. OREOCINCLA DAUMA.—Small-billed Mountain Thrush.

Ruchaung, N. Arakan, March 1910. Appears rare.

FAMILY PLOCEIDÆ.

720. PLOCEUS BAYA.—The Baya.

Common.

723. PLOCEUS MANYAR.—Striated Weaver-bird.

Common.

725*a*. MUNIA ORYZIVORA.—The Java Sparrow.

I met with a flock of six on September 26th, 1909, when snipe shooting: they were feeding on grass seeds, like common munias. Again, in March 1910 I saw a pair in Akyab cantonments and a single specimen in the paddy fields in April 1910. The birds are known to the Arakanese villagers, so the species may be taken as thoroughly established in Arakan.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

726. MUNIA ATRICAPILLA.—Chestnut-bellied Munia.

Common.

727. UROLONCHA ACUTICAUDA.—Hodgson's Munia.

Common. Breeds early in May, when I obtained several nests with fresh eggs.

735. UROLONCHA PUNCTULATA.—Spotted Munia.

Common everywhere.

739. SPORÆGINTHUS FLAVIDIVENTRIS.—Burmese Red Munia.

Fairly common. Found a nest of young birds at the end of August 1909 in a screw-pine on a bund in a paddy field.

FAMILY FRINGILLIDÆ.

761. CARPODACUS ERYTHRINUS.—Common Rose Finch.

A single specimen at Myohaung, 3rd March 1910. I am told the bird is not uncommon in this particular locality. It is one of the few places in the "plains" of Arakan, or rather of the Akyab district of Arakan, where there is a fair extent of jungle, other than mangrove jungle, and is consequently a good place for birds. The woodland near Myohaung would repay more careful exploration than I was able to give.

776. PASSER DOMESTICUS.—The House Sparrow.

It may be of interest to record that this bird is not found north of Kaladan on the Kaladan river. It does not occur at the little town of Paletwa, the head-quarters of N. Arakan; nor is it replaced by any other sparrow. At Akyab, I found a nest containing young sparrows built into a kite's nest, in which were young kites and the sparrows were quite unmolested. The sparrows also use old kingfisher's burrows, which are very numerous near Akyab, as nesting sites.

780. PASSER CINNAMOMEUS.—Cinnamon Tree Sparrow.

Rare.

I only identified one bunting, though I saw others.

797. EMBERIZA AUREOLA.—Yellow-breasted Bunting.

Occurs in large flocks, and is common in the cold weather months. I observed them as late as April.

FAMILY HIRUNDINIDÆ.

807. CHELIDON NEPALENSIS.—Hodgson's Martin.

Common at Kyaukpaudaung, where it breeds on the cliffs in April and May. The nests, as a rule, are inaccessible and I did not get eggs. The birds are occasionally met with, but are rare elsewhere.

809. COTILE SINENSIS.—Indian Sand Martin.

Common.

814. HIRUNDO GUTTURALIS.—Eastern Swallow.

Common everywhere in winter.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

815. HIRUNDO TYTLERI.—Tytler's Swallow.

Fairly common.

817. HIRUNDO JAVANICA.—Nilgiri House Swallow.

I failed to satisfy myself as to whether these birds are resident throughout the year, but I obtained eggs from some cliffs by the sea at Kyaukpgu at the end of March, and the birds are common in winter. Oates does not record this bird from Burma.

818. HIRUNDO SMITHII.—Wire-tailed Swallow.

Common. Nest with 4 eggs from a cliff on the Lemru river, N. Arakan April 12, 1909.

822. HIRUNDO NEPALENSIS.—Hodgson's Striated Swallow.

Appears to occur only in N. Arakan, where I met with it in April and May fairly commonly.

FAMILY MOTACILLIDÆ.

Wagtails are very numerous in Arakan. The following were actually identified, but there are probably others.

826. MOTACILLA ALBA.—White Wagtail.

Common everywhere.

828. MOTACILLA OCULARIS.—Streak-eyed Wagtail.

Upper Kaladan, N. Arakan, November 1908.

832. MOTACILLA MELANOPE.—Gray Wagtail.

Common in winter; earliest date of appearance September 20, 1909.

834. MOTACILLA FLAVA.—Blue-headed Wagtail.

Not uncommon.

839. LIMONIDROMUS INDICUS.—Forest Wagtail.

Twice seen in January and February 1909 but I failed to secure either specimen. I have shot it elsewhere in Burma, and once identified. It is easily recognised, so may be unhesitatingly recorded.

845. ANTHUS RICHARDI.—Richard's Pipit.

Common.

847. ANTHUS RUFULUS.—Indian Pipit.

Common everywhere, and I saw a pair carrying nesting materials in February; but as I was on the march, I did not look for the nest.

850. ANTHUS ROSACEUS.—Hodgson's Pipit.

A young bird, Akyab racecourse, 24th November 1908. Just assuming the pinkish tinge on head and neck; breast and sides heavily streaked. The specimen, which I had intended to preserve, was unfortunately stolen from my verandah by a crow!

FAMILY ALAUDIDÆ.

861. ALAUDA GULGULA.—Indian Sky-Lark.

Resident and breeds from March to May, in both of which months I got nests.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

870. MIRAFRA ASSAMICA.—Bengal Bush Lark.

Very common and resident.

FAMILY NECTARINIIDÆ.

The birds of this family are very plentiful in Arakan, but I only identified a few.

884. ÆTHOPYGA CARA.—Tenasserim Yellow-backed Sun-bird.

Oates says that it is "doubtful if this sun-bird extends to Arakan or not." I can now positively state that it is common in Arakan, being found usually on the edge of the forest, near the paddy fields.

895. ARACHNECTHRA ASIATICA.—Purple Sun-bird.

Common.

896. ARACHNECTHRA HASSELTI.—Van Hasselt's Sun-bird.

This beautiful Sun-bird is not uncommon.

898. ARACHNECTHRA FLAMMAXILLARIS.—Burmese Yellow-breasted Sun-bird.

Common.

903. ANTHOTHREPTES MALACCENSIS.—Brown-throated Sun-bird.

Fairly common.

909. ARACHNOTHERA LONGIROSTRIS.—Little Spider-Hunter.

Fairly common, but I never succeeded in finding a nest, though I think I must have been near one more than once, to judge from the excitement of the birds.

FAMILY DICÆIDÆ.

912. DICÆUM CRUENTATUM.—Scarlet-backed Flower Pecker.

Common.

914. DICÆUM CHRYSORRHŒUM.—Yellow-vented Flower Pecker.

Rather rare.

919. DICÆUM ERYTHRORHYNCHUS.—Tickell's Flower Pecker.

Not uncommon. A bold familiar little bird, which will settle close to one, and is far too intent on its own business to take much notice of one's movements.

I also saw, once or twice, a bird which I should be inclined to attribute to the genus *Prionochilus*; but as I did not obtain a specimen I cannot venture any more definite opinion.

FAMILY PITTIDÆ.

927. PITTA NEPALENSIS.—Blue-naped Pitta.

Not common. The jungle is not suitable for Pittas, but *P. cyanea* and *P. cyanoptera* are also recorded from Arakan, and would probably be found on Kyaukpaudaung.

This concludes the Passeres, of which I find I have actually identified 121 species. There is therefore plenty of scope for further research!

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

ORDER EURYLÆMI.

Family Eurylæmidæ.

I only met with two species, both on Kyankpaudaung. These were :—

943. Serilophus rubripygius.—Gould's Broadbill.

944. Psarisomus dalhousiæ.—Long-tailed Broadbill.

I got nests of both, May 7th to 9th, but whereas I only got one of *P. dalhousiæ*, I got about half a dozen of *S. rubripygius*, and frequently saw the birds.

ORDER PICI.

Family Picidæ.

In my nine years' experience of Burma, during which I have served in some ten "districts," I have never struck a place in which the *Pici* are so scarce as in Arakan. This is doubtless accounted for by the immense areas of bamboo jungle, and the paucity of tree growth ; but even in ordinary tree jungle, woodpeckers are far less numerous than usual. I wonder if the proximity of the sea, and the heavy rainfall has anything to do with this. The following list is complete as far as my observations went, as I did not see a single woodpecker which I failed to identify.

951. Gecinus chlorolophus.—Small Himalayan Yellow-naped Woodpecker.

Common.

958. Gecinulus grantia.—Northern Pale-headed Woodpecker.

Fairly common in the bamboo jungle.

967. Dendrocopus macii.—Fulvous-breasted Pied Woodpecker.

Common ; nest in Akyab in a bamboo which had been used as a post in a deserted hut, June 1909, with three young.

988. Tiga javanensis.—Common Golden-backed Three-toed Woodpecker.

Very common.

992. Chrysocolaptes guttigristatus.—Tickell's Golden-backed Woodpecker.

Common.

995. Hemicercus canente.—Heart-spotted Woodpecker.

Fairly common.

996. Hemilophus pulverulentus.—Great Slaty Woodpecker.

I only saw one pair, and found the nest hole on May 10th, 1910, but it proved inaccessible to my great disappointment. It was in a huge "Kauyin" (wood-oil) tree, fully eighty feet from the ground.

1002. Sasia ochracea.—Rufous Piculet.

Common.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

ORDER ZYGODACTYLI.

Family Capitonidæ.

1009. Thereiceryx lineatus.—Lineated Barbet.

Common.

1012. Cyanops asiatica.—Blue-throated Barbet.

Common. I got a nest with two fresh eggs on the road to Kyaukpaudaung at about 3,000 feet, May 7th, 1909.

1019. Xantholæma hæmatocephala.—"Coppersmith."

Very common.

ORDER ANISODACTYLI.

Family Coraciadæ.

1023. Coracias affinis.—Burmese Roller.

Very common.

1025. Eurystomus orientalis.—Broad-billed Roller.

Fairly common.

Family Meropidæ.

1026. Merops viridis.—Common Indian Bee-eater.

1027. Merops philippinus.—Blue-tailed Bee-eater.

Appears to be more or less migratory, as I noticed both in 1909 and 1910 that it was far more abundant in the breeding season, April and May, than at other times.

1030. Melittophagus swinhoii.—Chestnut headed Bee-eater.

Common.

1031. Nyctiornis athertoni.—Blue-bearded Bee-eater.

Not uncommon. I found a nest early in May, 1910, but without eggs.

Family Alcedinidæ.

1033. Ceryle varia.—Indian Pied Kingfisher.

Very common. I found young birds just able to fly on March 21st, 1909; and got a nest with 5 eggs on April 13th, 1910.

1034. Ceryle lugubris.—Himalayan Pied Kingfisher.

N. Arakan, Lemin river only, but common there.

1035. Alcedo ispida.—Common Kingfisher. Common.

1041. Pelargopsis amauroptera.—Brown-winged Kingfisher.

Common near the sea coast, and in mangrove swamps. This bird has the habit of plunging into the surf, and settling on the sand while it secures its prey, allowing the waves to break over it.

1043. Pelargopsis gurial.—Brown-headed Stork-billed Kingfisher.

Common, but keeps most to the fresh water, rarely coming down to tidal limits. *P. amauroptera*, on the contrary, I never found frequenting fresh water.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

1044. HALCYON SMYRNENSIS.—White-breasted Kingfisher.

Very common.

1045. HALCYON PILEATA.—Black-capped Kingfisher.

Very common in tidal jungle, and along brackish creeks. Common as it was, I totally failed to find a nest.

1047. SAUROPATIS CHLORIS.—White-collared Kingfisher.

Common in same habitat as *H. pileata*, and very noisy. This bird undoubtedly breeds in holes of dead trees, and apparently excavates its own burrow. I found several such holes, but failed to obtain eggs. My friend Mr. Wickham, however, got them from trees in the Andamans, and I have a clutch which he gave me. One of my clerks told me that there was a nest of this species in a tree in his compound at Akyab a few years ago. The bird is commonly seen in the gardens in Akyab town, and I have no reason to disbelieve his statement.

FAMILY BUCEROTIDÆ.

1051. DICHOCEROS BICORNIS.—Great Hornbill.

Common.

1053. ANTHRACOCEROS ALBIROSTRIS.—Indo-Burmese Pied Hornbill.

Common. I had two of these birds as pets, and they were extremely tame, flying about loose in the compound, and coming into the house when they wanted food. As an amusing pet, this bird is hard to beat; but it is a tyrant in an aviary, and will kill small birds.

1054. RHYTIDOCEROS UNDULATUS.—Malayan Wreathed Hornbill.

Not common, confined to the hills, and very shy and wary. I did not succeed in collecting a specimen, but identified them with the aid of field glasses.

FAMILY UPUPIDÆ.

1067. UPUPA INDICA.—Indian Hoopoe.

Common. I once took a single young bird from a nest (the others had, I suppose, flown), and put it in a cage in my verandah, fully 300 yards from its nest. Within a few hours the old birds were feeding it, and continued to do so for two days, when it made its escape.

ORDER MACROCHIRES.

FAMILY CYPSELIDÆ.

1074. CYPSELUS SUBFERCATUS.—Malayan House Swift.

Breeds in hundreds on Kyaukpandaung in May, but the nests were inaccessible.

1076. TACHORNIS INFUMATUS.—Eastern Palm Swift.

Common.

1078. CHÆTURA INDICA.—Brown-necked Spine-tail.

Common.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

FAMILY CAPRIMULGIDÆ.

1091. CAPRIMULGUS ASIATICUS.—Common Indian Nightjar.
Common.

1093. CAPRIMULGUS MACRURUS.—Horsfield's Nightjar.
Common.

1096. LYNCORNIS CERVINICEPS.—Great Eared Nightjar.
Fairly common.

ORDER TROGONES.

FAMILY TROGONIDÆ.

1101. HARPACTES ERYTHROCEPHALUS.—Red-headed Trogon.
Common.

1103. HARPACTES ORESCIUS.—Yellow-breasted Trogon.
I made the acquaintance of this beautiful Trogon for the first time in Arakan. It is not common.

ORDER COCCYGES.

FAMILY CUCULIDÆ.

1104. CUCULUS CANORUS.—The Cuckoo.
Two in September, 1908. Presumably migrating.

1107. CUCULUS MICROPTERUS.—Indian Cuckoo.
Fairly common.

1108. HIEROCOCCYX SPARVERIOIDES.—Large Hawk-Cuckoo.
Not common.

1113. CACCOMANTIS MERULINUS.—Rufous-bellied Cuckoo.
Not common.

1114. PENTHOCERYX SONNERATI.—Banded Bay Cuckoo.
Rare.

1119. COCCYSTES COROMANDUS.—Red-winged Crested Cuckoo.
Met with occasionally but not commonly. I also have it in my mind that I saw *C. jacobinus*, and failed to note it in my book, so it must be considered a "doubtful starter."

1120. EUDYNAMIS HONORATA.—Indian Koel.
For a koël-ridden place, commend me to Akyab. There are more koëls to the square yard, I should imagine, than in any other portion of the Indian Empire. I am inclined to agree that the bird is partially migratory, as it is far more common in the breeding season than at other times. As stated above *C. splendens* breeds in Arakan in March, and the koël of course, follows suit. During the first week in March 1909, I got koël's eggs *ad. lib.* and I believe I established a record, on March 4, when I took seven koël's eggs from one crow's nest (and incidentally performed a public service). There were no crow's eggs in this nest, and the koël's

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

eggs were all fresh. The eggs were of three distinct types, and made three natural clutches of 3, 2, and 2. I presume three koëls were laying in this nest, and the crows had given it up as a bad job. I saw crows feeding young koëls as late as July.

1123. RHOPODYTES TRISTIS.—Large Green-billed Malkoha.

Fairly common.

1130. CENTROPUS SINENSIS.—Common Corocal.

Common.

ORDER PSITTACI.

FAMILY PSITTACIDÆ.

1136. PALÆORNIS INDOBURMANICUS.—Large Burmese Paroquet.

Common.

1138. PALÆORNIS TORQUATUS.—Rose-ringed Paroquet.

Common.

1145. PALÆORNIS FASCIATUS.—Red-breasted Paroquet.

By far the commonest parrot in Arakan.

1150. LORICULUS VERNALIS.—Indian Loriquet.

Common.

P. schisticeps or *finschi* probably occurs, but I failed to meet with either.

ORDER STRIGES.

FAMILY ASIONIDÆ.

1164. KETUPA ZEYLONENSIS.—Brown Fish Owl.

Common, and breeds in Akyab.

1178. SCOPS BAKKAMŒNA.—Collared Scops Owl.

Common. I found two nests with young in April 1909 and 1910.

1180. ATHENE BRAMA.—Spotted Owlet.

Common.

1187. NINOX SCUTULATA.—Brown Hawk Owl.

I know the call of this owl well, having shot them, whilst shooting, in the Chindwin. I did not actually see a specimen in Arakan, but frequently heard them calling, so include it in my list.

ORDER ACCIPITRES.

FAMILY PANDIONIDÆ.

1189. PANDION HALIAETUS.—The Osprey.

A not uncommon winter visitor, usually met with near the sea.

FAMILY VULTURIDÆ.

1191. OTOGYPS CALVUS.—Black Vulture.

Rather rare.

1195. GYPS TENUIROSTRIS.—Himalayan Long-billed Vulture.

Common.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

1196. PSEUDOGYPS BENGALENSIS.—Indian White-backed Vulture.

Very common.

FAMILY FALCONIDÆ.

1212. SPIZAËTUS LIMNAËTUS.—Changeable Hawk Eagle.

Not common: but I was lucky enough to get a nest, with a single hard set egg, on April 22nd, 1910.

1217. SPILORNIS CHEELA.—Crested Serpent Eagle.

The commonest eagle in Arakan, found everywhere.

1223. HALIAËTUS LEUCORYPHUS.—Pallas' Fishing Eagle.

Fairly common. Found a nest without eggs on 9th November 1909.

1224. HALIAËTUS LEUCOGASTER.—White-bellied Sea Eagle.

Very common near the sea. I found several nests in October and November, but always failed to get eggs.

1226. POLIOAËTUS ICHTHYAËTUS.—Large Gray-headed Fishing Eagle.

Fairly common. Nest with almost fledged chick on January 26th, 1910.

1228. HALISTUR INDUS.—Brahminy Kite.

Very common.

1229. MILVUS GOVINDA.—Common Pariah Kite.

Very common.

1232. ELANUS CÆRULEUS.—Black-winged Kite.

Rare.

1233. CIRCUS MACRURUS.—Pale Harrier.

Very common in winter.

1236. CIRCUS MELANOLEUCUS.—Pied Harrier.

Common in winter.

1237. CIRCUS ÆRUGINOSUS.—Marsh Harrier.

Common in winter.

1244. ASTUR BADIUS.—The Shikra.

Common.

1254. FALCO PEREGRINUS.—Peregrine Falcon.

Not common.

1265. TINUNCULUS ALAUDARIUS.—Kestrel.

Common, especially in the hot weather. I noticed large numbers of Kestrels on Akyab race course, in March and April; on shooting a specimen, I found that it had been feeding almost entirely on a kind of large cricket, which is very abundant at this time of year; and which doubtless attracts the hawks.

ORDER COLUMBÆ.

FAMILY COLUMBIDÆ.

1271. CROCOPUS PHŒNICOPTERUS.—Bengal Green Pigeon.

Rare.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

1273. OSMOTRERON PHAYREI.—Ashy-headed Green Pigeon.

Very common.

1278. OSMOTRERON BICINCTA.—Orange-breasted Green Pigeon.

Fairly common. On March 13, 1909, I got a nest with two slightly incubated eggs. The nest was placed in a pollarded stump, only a few feet from the ground, and the eggs were plainly visible when the bird flew away.

1281. TRERON NEPALENSIS.—Thick-billed Green Pigeon.

Not common.

1284. CARPOPHAGA ÆNEA.—Green Imperial Pigeon.

Common, and breeds from February to May, as I have found nests in both months.

1289. MYRISTICIVORA BICOLOR.—Pied Imperial Pigeon.

This I believe to be the first record from Burma, at all events from the mainland. One of my men shot three from a flock of four in February 1910, a little south of Sandoway; one of the skins was sent to the Bombay Natural History Society. The villagers at once recognised the birds, and say they are numerous, and breed, in the islands off the coast, visiting the mainland in the winter months. The crops of the birds shot were stuffed with wild figs; and the birds were far superior to *C. ænea* for the table.

1291. CHALCOPHAPS INDICA.—Bronze-winged Dove.

Common.

1304. TURTUR ORIENTALIS.—Rufous Turtle Dove.

Common.

1308. TURTUR TIGRINUS.—Malay Spotted Dove.

Very common.

1311. ŒNOPOPELIA TRANQUEBARICA.—Red Turtle Dove.

Fairly common.

ORDER GALLINÆ.

FAMILY PHASIANIDÆ.

1325. PAVO MUTICUS.—Burmese Peafowl.

Occurs sparingly in the Sandoway District.

1327. POLYPLECTRUM CHINQUIS.—Gray Peacock-Pheasant.

Not uncommon in the N. Arakan Hill tracts.

1328. GALLUS FERRUGINEUS.—Red Jungle Fowl.

Common.

1340*d*. GENNÆUS CUIVIERI.

Silver Pheasants are not common as a rule, as the Jungle is unsuitable. But in N. Arakan they are fairly plentiful throughout and along the Ru stream, a feeder of the Lemru, they positively swarm. The specimens collected by me, and sent to the late Mr. Oates, were identified by him

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

as *G. prendergarsti*. However, on comparison with the types in the British Museum, my specimens were found to be identical with *G. cuivieri* and were identified and labelled by Mr. Ogilvie Grant as such. I only met with the one variety, but one male approximates to typical *G. horsfieldi*. This came from the Chittagong border.

1354. EXCALFACTORIA CHINENSIS.—Blue-breasted Quail.

Fairly common on swampy grazing grounds. This bird seems to have a very strong scent, as my spaniel used always to get very keen when they were about.

1364. ARBORICOLA INTERMEDIA.—Arakan Hill Partridge.

Common almost everywhere in the jungle, and easily detected once its call is known. Breeds in March, when I obtained eggs.

1365. ARBORICOLA ATRIGULARIS.—White-cheeked Hill Partridge.

Rare. I only obtained one specimen, at about 2,000 feet, on the road to Kyaukpandung.

ORDER HEMIPODII.

FAMILY TURNICIDÆ.

1382. TURNIX PUGNAX.—Bustard Quail.

Found almost everywhere, in suitable localities, but never common in any one place.

1386. TURNIX BLANFORDI.—Burmese Button Quail.

Rare.

ORDER GRALLÆ.

As soon as we arrive at the water birds, waders, herons, storks, etc., the number of common species rapidly increases, as might be expected in a district offering such a variety of suitable localities, as does the coast line of Arakan.

FAMILY RALLIDÆ.

1389. HYPOTÆNIDIA STRIATA.—Blue-breasted Rail.

Very common.

1401. AMAURORNIS PHŒNICURUS.—White-breasted Moorhen.

Very common; breeds in Akyab town.

1402. GALLINULA CHLOROPUS.—Moorhen.

Common.

1403. GALLICREX CINEREUS.—Kora.

Common.

1404. PORPHYRIO POLIOCEPHALUS.—Purple Moorhen.

Rather rare.

1405. FULICA ATRA.—Coot.

Not common.

Species of *Poozana* and *Rallina* also occur, but I failed to identify any.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

FAMILY HELIORNITHIDÆ.

1406. HELIOPAIS PERSONATA.—Masked Finfoot.

One evening, whilst fishing with my friend Mr. Pickthall, in a deep pool on the Ru stream, a bird which we took to be a duck, flew down and settled with a loud grunting quack. My friend fired, and the bird, hard hit, struggled into the elephant grass. On being driven out, it swam and dived well for several minutes, until secured; all the time it kept uttering its monosyllabic grunt. It proved to be a fine male, and the skin is now in Mr. Pickthall's possession. The date was March 9th, 1910.

FAMILY GRUIDÆ.

1409. GRUS ANTIGONE.—The Sarus.

Cranes are not common: the only one I shot proved to be *G. antigone* and not *G. sharpii*.

1411. ANTHROPOIDES VIRGO.—Demoiselle Crane.

On New Year's Day, 1909, I saw three of these birds, which I easily identified with my glass, though they were too wary to allow of my shooting any. There were, apparently, one old and two young birds.

ORDER LIMICOLÆ.

FAMILY ŒDICNEMIDÆ.

1419. ESACUS RECURVIROSTRIS.—Great Stone Plover.

Rare, but I met with it at Kyaukpyu. In N. Aracan I saw birds which were probably *Œ. scolopax*.

FAMILY GLAREOLIDÆ.

1425. GLAREOLA ORIENTALIS.—Large Indian Pratincole.

Very common and resident. In 1909 I was too late for eggs, but found a young bird. In 1910, I determined to get eggs, and after several days' hunting got the knack of it, when my Burman "boy" and I succeeded in finding about twenty nests. The birds were breeding in paddy stubble, near the sea, just outside Akyab town; the nests are best found by flushing the birds, and then watching them return, when they run to the nest and squat down. The nests were all found during the last week in April.

1427. GLAREOLA LACTEA.—Small Indian Pratincole.

Much less common than *G. orientalis*, but resident and breeds.

FAMILY PARRIDÆ.

1428. METOPODIUS INDICUS.—Bronze-winged jacana.

Common.

1429. HYDROPHASIANUS CHIRURGUS.—Pheasant-tailed jacana.

Fairly common.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

FAMILY CHARADRIDÆ.

1430. STREPSILAS INTERPRES.—Turnstone.

Four birds on October 5th, 1909, on the rocks near Fakir point, at Akyab.

1432. SARCOGRAMMUS ATRINUCHALIS.—Burmese Wattled Lapwing.

Common.

1435. HOPLOPTERUS VENTRALIS.—Indian Spur-winged Plover.

Fairly common.

1439. CHARADRIUS FULVUS.—Eastern Golden Plover.

Occurs in vast numbers from September to May, by which time the birds are assuming breeding plumage. I kept one in my aviary for several months, and it throve exceedingly on a diet of white ants. It was liberated in May.

1441. SQUATAROLA HELVETICA.—Grey Plover.

A not uncommon winter migrant.

1442. ÆGIALITIS GEOFFROYI.—Large Sand Plover.

A common shore bird, from August to February or March.

1447. ÆGIALITIS DUBIA.—Little Ringed Plover.

Very common.

1451. HIMATOPUS CANDIDUS.—Black-winged Stilt.

Rare.

1454. NUMENIUS ARQUATA.—Curlew.

Very common. I have seen them as late as June and as early as August.

1455. NUMENIUS PHŒOPUS.—Whimbrel.

Equally common; returns in August, and appears to leave about April or May.

1460. TOTANUS HYPOLEUCUS.—Common Sandpiper.

Very common.

1461. TOTANUS GLAREOLA.—Wood Sandpiper.

Very common.

1462. TOTANUS OCHROPUS.—Green Sandpiper.

Very common.

1463. TOTANUS STAGNATILIS.—March Sandpiper.

Rare.

1464. TOTANUS CALIDRIS.—Redshank.

Very common; August to April or May.

1465. TOTANUS FUSCUS.—Spotted Redshank.

Common.

1466. TOTANUS GLOTTIS.—Greenshank.

Very common; August to March.

1472. TRINGA RUFICOLLIS.—Eastern Little Stint.

Fairly numerous.

1482. SCOLOPAX RUSTICOLA.—Woodcock.

A very rare visitor. One was shot in the winter of 1908.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

1484. Gallinago cœlestis.—Common Snipe.

Less common than *G. stenura*. The first shot was on September 25th 1910, and on October 10th, 1909. Last shot about end of January.

1485. Gallinago stenura.—Pintail Snipe.

Very plentiful. Arrive between August 20th and 25th and stragglers remain till the end of April.

1488. Rostratula capensis.—Painted Snipe.

Unaccountably rare, as there are many suitable localities.

ORDER GAVIÆ.

Family Laridæ.

1489. Larus ichthyætus.—Great Black-headed Gull.

On November 20th, 1909, I observed three very large Gulls, in company with *G. brunneicephalus*. They were too wary to allow of my shooting one, but from what I could make out through my glass, I think they must have been *L. ichthyætus*.

1491. Larus brunneicephalus.—Brown-headed Gull.

The Gulls arrived about the end of October, and are then commonly met with throughout the winter. In 1909 they left in Apirl, when most had assumed breeding plumage ; in 1910, breeding plumage was assumed about the same time, but they did not leave till the beginning of May.

1496. Hydrochelidon hybrida.—Whiskered Tern.

Commonest in winter, but as there are always a few about, it probably breeds. As the whole country is under water in the rains, there is an ample choice of nesting sites.

1502. Sterna bergii.—Large Crested Tern.

Very common. According to Hume, they used to breed on Oyster Island, some three hours out from Akyab ! but there is a Lighthouse there now, and this seems to have scared them, as they no longer breed there.

1503. Sterna seena.—Indian River Tern.

Rare.

1517. Rhyncops albicollis.—Indian Skimmer.

Fairly common.

ORDER STEGANOPODES.

Family Pelicanidæ.

1523. Pelecanus philippensis.—Spotted-billed Pelican.

Common.

Family Phalacrocoracidæ.

1526. Phalacrocorax carbo.—Large Cormorant.

Common.

1528. Phalacrocorax javanicus.—Little Cormorant.

Very common.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

1529. PLOTUS MELANOGASTER.—Indian Darter.

Very common.

ORDER HERODIONES.

FAMILY IBIDIÆ.

1541. IBIS MELANOCEPHALA.—White Ibis.

Extremely common, but appears to be partially migratory, as most of the birds disappear in the breeding season, and I failed to find nests.

1543. INOCOTIS DAVISONI.—Davison's Black Ibis.

Not uncommon, and usually found in pairs, but very wary. An excellent bird for the table.

FAMILY PLATELEIDÆ.

1545. PLATALEA LEUCORODIA.—Spoonbill.

My first record was a young bird, shot on November 1st, 1908. It was by itself but I subsequently met with several small parties in the same locality both in 1908 and 1909. The place was not far from Akyab, and was the site of an old irrigation tank, now no longer extant, the bund having been destroyed. The birds are probably the remnants of a colony which bred there when the tank contained water.

FAMILY CICONIIDÆ.

1548. DISSURA EPISCOPUS.—White Necked Stork.

Common.

1549. XENORHYNCHUS ASIATICUS.—Black-necked Stork.

Common.

1550. LEPTOPTILUS DUBIUS.—Adjutant.

Common.

1551. LEPTOPTILUS JAVANICUS.—Smaller Adjutant.

Rather rare.

1552. PSEUDOTANTALUS LEUCOCEPHALUS.—Painted Stork.

Common.

1553. ANASTOMUS OSCITANS.—Open-bill.

Not common, but occasionally met with in small parties.

I failed to find the nest of any stork though doubtless they breed in Arakan.

FAMILY ARDEIDÆ.

1554. ARDEA MANILLENSIS.—Eastern Purple Heron.

Very common.

1555. ARDEA CINEREA.—Common Heron.

Very common.

1556. ARDEA SUMATRANA.—Dusky Grey Heron.

Fairly common. Haunts the mangrove swamps and muddy brackish creeks.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

1557. Ardea insignis.—Great White-bellied Heron.
Occasionally met with on the larger jungle streams.
1559. Herodias alba.—Large Egret.
Very common.
1561. Herodias garzetta.—Little Egret.
Very common.
1562. Bubulcus coromandus.—Cattle Egret.
Very common.
1564. Lepterodius sacer.—Eastern Reef Heron.
Very common.
1565. Ardeola grayi.—Pond Heron.
Very common.
1568. Nycticorax griseus.—Night Heron.
Very common.
1572. Ardetta cinnamomea.—Chestnut Bittern.
Very common.
1573. Dupetor flavicollis.—Black Bittern.
Very common, generally in nullahs amongst the paddy fields.

ORDER ANSERES.

Family Anatidæ.

1584. Sarcidiornis melanonotus.—Comb Duck.
Common.
1584. Asarcornis scutulatus.—White-winged Wood Duck.
Occasionally met with in N. Arakan, haunting the larger streams.
1587. Tadorna cornuta.—Sheldrake.
I obtained one from a party of three on January 31st, 1910, in the Kyaukpyu district. The skin was sent to the Bombay Natural History Society.
1588. Casarca rutila.—Brahminy Duck.
Visits Arakan in enormous numbers in the cold weather.
1589. Dendrocygna javanica.—Whistling Teal.
Very common.
1591. Nettopus coromandelianus.—Cotton Teal.
Common.
1594. Eunetta falcata.—Crested Teal.
A single female, February 1909, Kyankpyn district.
1597. Nettium crecca.—Common Teal.
Common from October to March.
1599. Mareca penelope.—Wigeon.
Obtained two birds from a flock of about 40 on February 1st, 1909, and a single bird in December 1909, Kyaukpyu district.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

1600. DAFILA ACUTA.—Pintail.

Visits Arakan in enormous numbers from December to March, but as there are few decent jheels, the birds are most often seen in the estuaries of rivers, where they are unapproachable.

1601. QUERQUEDULA CIRCIA.—Garganey.

There are generally a few garganeys with the common teal, but they are not very plentiful.

1602. SPATULA CLYPEATA.—Shoveller.

Rare. I did not see any during the season 1908-09, but shot three during 1909-10.

1607. NYROCA BAERI.—Saw about half a dozen altogether, and shot two. In each case the bird was by itself, did not meet with any flocks of *N. ferruginea*, so assume that the single birds which I saw and did not shoot were *N. baeri*.

ORDER PYOPODES.

FAMILY PODICIPEDIDÆ.

1617. PODICEPS ALBIPENNIS.—Indian Little Grebe.

Very common.

This completes my list, which numbers 294 species actually identified.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

THE MOTHS OF INDIA.

SUPPLEMENTARY PAPER TO THE VOLUMES IN "THE FAUNA OF BRITISH INDIA." SERIES IV, PART V.

BY

Sir George F. Hampson, Bart., F.Z.S., F.E.S.

(*Continued from page* 911 *of this Volume*).

Catocalinæ.

2443*a*. Homoptera eremochroa, n. sp.

♀. Head, thorax and abdomen pale grey-brown; palpi white, the extremity of 2nd joint and the 3rd joint blackish; pectus, legs and ventral surface of abdomen white, the fore tarsi black ringed with white. Forewing brownish grey irrorated with black, the costa with numerous black striæ with slight whitish streaks between them; subbasal line represented by black points on median nervure and vein 1; antemedial line black, minutely waved and slightly excurved; reniform a minute lunule with traces of a blackish line from it to inner margin; postmedial line indistinctly double, slightly bent outwards below costa and incurved at discal fold, incurved below vein 4 and excurved at vein 1; subterminal line indistinctly double filled in with grey, angled outwards at vein 7 and excurved at middle; a minutely waved black line just before termen with series of black points in the interspaces. Hindwing brownish grey with dark striæ on inner margin; traces of four waved dark lines on terminal half; a lunulate black line just before termen; cilia whitish with a brown line through them; the underside white irrorated with pale brown except on basal and inner areas, a slight discoidal point and waved blackish terminal line.

Habitat.—Bombay, Deesa (Nurse). *Exp*. 24 mill. Type in B. M.

2446*a*. Homoptera ruficolora, n. sp.

♂. Head, thorax and abdomen bright rufous mixed with some ochreous; antennæ blackish; tarsi blackish ringed with whitish. Forewing bright rufous; subbasal line deep rufous, double, waved, from costa to median nervure; antemedial line deep rufous, minutely waved, inwardly oblique; medial line minutely waved, excurved; postmedial line indistinctly double, oblique from costa to vein 6, slightly incurved at discal fold, incurved and minutely waved below vein 4; subterminal line indistinct, brown, excurved below vein 7 and at middle; a terminal series of slight brown striæ. Hindwing greyish white, the veins and terminal area suffused with bright rufous; a postmedial series of minute dark

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

streaks on the veins and a striga at inner margin with another dark striga before it; a terminal series of slight brown striæ; the underside ochreous white, the costal area slightly irrorated with red-brown.

Habitat.—MADRAS, Gooty (Campbell). *Exp.* 32 mill. Type in B. M.

2526*b*. HYPÆTRA PULCHERRIMA, Butl., A. M. N. H., 1892, p. 298.

„ *tepesceus*, Swinh., A. M. N. H. (7) xvi, p. 152 (nec Wlk.).

Head rufous; palpi brown; sides of frons deep brown with fine whitish streaks above; thorax rufous and deep brown; abdomen brown, the dorsal crests rufous. Forewing brown with a violaceous tinge; a black spot on costal area near base finely defined by whitish; a broad deep black antemedial band from costa to just above inner margin, its inner edge defined by a fine whitish line and angled outwards in cell, its outer edge by a whitish band diffused outwardly; a blackish spot on costa above end of cell; an oblique cocked-hat-shaped mark just beyond the cell finely defined by whitish, its upper extremity curved up to below costa and its lower bent inwards to lower angle of cell, its outer edge forming the postmedial line, angled upwards from its lower extremity into cell, then excurved and forming two small black lunules finely defined by white on inner area, a rufous shade beyond it; a small blackish spot below costa towards apex; the terminal area rather darker. Hindwing uniform brown.

Habitat.—ANDAMANS, Port Blair; SINGAPORE; BORNEO; BR. N. GUINEA.

Exp. 50 mill.

2527*a*. HYPÆTRA HETEROGRAPHA, n. sp.

♂. Antennæ bipectinate with moderate branches, the apical part simple; hindwing with fold between veins 6·7 clothed with glossy scales on upper side. Head, thorax and abdomen reddish brown; tarsi pale. Forewing reddish brown suffused with grey except medial part of costal area; subbasal line represented by a small curved black mark from costal with point below it; a large irregularly triangular black antemedial patch from cell to just above inner margin, its apex connected with the costa by a sinuous line with small black spot before it below the costa; a black point in middle of cell; two sinuous red-brown indistinct medial lines, oblique from costa to lower angle of cell, where there is a black point, and with small diffused spot on its inner edge on discocellulars, below the cell incurved to submedian fold, then bent outwards, an oblique black bar beyond it from costa; an irregular obliquely placed cocked-hat-shaped black patch beyond the cell, its upper extremity forming an oblique line to below the costa and its lower curved inwards to below angle of cell, then with bisinuate line to inner margin; subterminal line indistinct, irregularly waved, angled inwards at discal and submedian folds and with oblique black striga on it below costa; the terminal area somewhat redder brown. Hindwing grey brown with glossy scaling between veins 6·7 and slight dark subterminal

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

marks at veins 2 and 1; the underside greyer with slight brown postmedial striga below vein 2.

Habitat.—Burma, Tenasserim, Moolayit. *Exp.* 48 mill. Type in B. M.

2490*a*. Ophiusa rubida, Wlk., Journ. Linn. Soc. Zool. vii., p. 179 (1864).

Head and tegulæ deep chocolate red; thorax greyish brown; pectus pale rufous; legs fuscous mixed with grey; abdomen fuscous, the extremity and ventral surface pale grey. Forewing deep chocolate red, the medial area with a greyish gloss to median nervure; a terminal whitish band irrorated with brown, bent outwards to apex and narrowing to tornus; a fine dark antemedial line, very oblique from costa to below the cell, then obsolete; a black point in middle of cell; two minute grey discoidal spots defined by chocolate; a slight dark postmedial line very oblique from costa to vein 6, then obsolete; an indistinct diffused waved brown subterminal line; a fine waved line just before termen; a slight dark terminal line; cilia fuscous with series of whitish points at base. Hindwing fuscous black; an oblique bluish white band from middle of costa to above tornus; the termen narrowly whitish from below apex to submedian fold with a waved brown terminal line; cilia white; the underside grey-white, the terminal area suffused with fuscous, broadly at apex, narrowing to tornus.

Habitat.—Assam, Khásis, Jaintias; Borneo, Sarawak. *Exp.* 76 mill.

2491*a*. Ophiusa lacteicincta, n. sp.

♀. Head and tegulæ deep chocolate red; thorax greyish; pectus whitish tinged with rufous; legs grey-brown; abdomen fuscous brown, the extremity grey, the ventral surface whitish tinged with rufous. Forewing grey-brown tinged with chocolate deepening towards the brownish white terminal band which is bent outwards to apex and narrows to tornus; a fine dark subbasal line from costa to submedian fold; ante- and postmedial lines dark-brown, very oblique, the latter slightly curved; a black point in middle of cell; two minute grey discoidal spots defined by brown, a diffused brown subterminal line; a fine waved brown line just before termen; a slight brown terminal line. Hindwing greyish brown, the termen and cilia brownish white from apex to vein 1; the underside brownish white, the terminal area tinged with brown.

Habitat.—Assam, Shillong (Rawlings). *Exp.* 76 mill. Type in B. M.

Plusianæ.

2667*a*. Plusia exquisita. Feld. Reis. Nov. pl. 110, f. 30 (1874).

Head and thorax whitish mixed with brown; metathorax with some black scales; tarsi brownish ringed with white; abdomen white slightly tinged with red-brown. Forewing whitish mostly suffused with rufous brown and slightly irrorated and striated with black; a waved white

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

subbasal line from costa to vein 1 defined by black on inner side; a waved black antemedial line defined by white on inner side and with blue-grey lunules before it in submedian interspace; orbicular pure white, elongate elliptical and conjoined to a large oblique elliptical white spot below the cell; reniform narrow, defined by white and strongly constricted at middle, a black spot above it on costa; postmedial line black, slightly defined by white on outer side, minutely waved below costa, then oblique, somewhat dentate, and angled outwards at vein 3, some blue-grey beyond it between veins 5 and 2; subterminal line black, defined by brown on inner side and white on outer, excurved below costa, angled inwards in discal fold, then somewhat dentate, a fine black terminal line with narrow brown band before it, defined by white striæ on inner side; cilia chequered brown and white. Hindwing bright yellow with broad fuscous terminal band; cilia chequered brown and white.

Habitat.—Natal; Cape Colony; Baluchistan, Quetta. *Exp.* 36 mill.

2677*a*. Plusia megaloba, n. sp.

♀. Head fiery red; palpi and antennæ rufous, the latter with the basal joint whitish; thorax rufous, the tegulæ tinged with fiery red and the metathorax with brown; tarsi with slight pale rings; abdomen greyish rufous, the dorsal crests fiery red, the basal crest tipped with black. Forewing rufous with a greyish tinge, the medial area, except towards costa, and the medial part of terminal area suffused with brilliant cupreous red; subbasal line represented by an oblique golden striga from costa defined on each side by some cupreous red; the stigma below the cell silvery white forming a small oblique elliptical spot conjoined to a large conical spot beyond it; orbicular slightly defined by silver, round, open above; reniform with silver bar on inner edge and angled mark on outer; postmedial line slight, silvery defined by brown on inner side, erect, sinuous, some whitish points beyond it on costa; an indistinct irregularly dentate subterminal brown line; cilia grey-brown. Hindwing cupreous brown with a greyish tinge; cilia brown at base, grey at tips.

Habitat.—Assam, Khasis (Badgley). *Exp.* 26 mill. Type in B. M.

2681*a*. Plusia chalcopasta, n. sp.

Hind tibiæ and 1st joint of tarsi of male fringed with long hair; abdomen with lateral tufts of very long hair.

Head and thorax bronze-brown slightly mixed with greyish, the tegulæ, patagia and metathoracic crests tipped with whitish scales; tarsi slightly ringed with whitish; abdomen red-brown. Forewing purplish grey-brown suffused with golden bronze, the lines golden bronze; subbasal line slight, oblique, from costa to median nervure; antemedial line inwardly oblique, sinuous, a bisinuate striga from it to near postmedial line below the cell, with some purplish grey above it in and below the cell; orbicular and reniform with faint bronze annuli, the former round, the latter oblique elliptical;

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

postmedial line oblique, slightly incurved below discal fold; subterminal line more golden with some cupreous bronze on its inner side and dark suffusion before it and beyond it at apex, excurved from below costa to vein 6, then oblique; a terminal series of slight golden striæ. Hindwing fuscous brown with a reddish bronze gloss; cilia whitish with a dark line near base; the underside grey irrorated with brown, the terminal half suffused with brown except the termen.

Habitat.—N. INDIA (Walhouse); MADRAS, Gooty (Campbell), Nilgiris (Lindsay, Hampson); CEYLON, Maskeliya (de Mowbray), Pattipola (Green). *Exp.* 42-48 mill. Type in B. M.

Genus OMORPHINA.

Type.

Omorphina, Alph. Hor. Soc. Ent. Ross., XXVI., p. 452 (1892)..*aurantiaca.*

Proboscis fully developed; palpi obliquely porrect, slender, the 1st and 2nd joints fringed with long hair in front, the 3rd rather long; frons smooth; eyes small, reniform; antennæ of male ciliated; head and thorax clothed with rough hair only and without crests; tibiæ clothed with long hair; abdomen with some rough hair at base but without crests. Forewing short and broad, the apex rounded, the termen evenly curved; veins 3 and 5 from near angle of cell; 6 from upper angle; 9 from 10 anastomosing with 8 to form the areole; 11 from cell. Hindwing with veins 3·4 from angle of cell; 5 fully developed from above angle; 6·7 from upper angle; 8 anastomosing with the cell near base only.

2688*a*. OMORPHINA AURANTIACA, Alph. Hor. Soc. Ent. Ross., XXVI., p. 452 (1892); id. Rom. Mém. ix., p. 41, pl. 1 f. 2. Staud. Cat. Lep. pal., p. 220.

Head, thorax and abdomen black clothed with bright rufous hair; palpi and legs with fuscous hair mixed, the anal tuft pale rufous. Forewing bright rufous, the basal half slightly suffused with fuscous; traces of a sinuous dark antemedial line; orbicular and reniform defined by deep rufous, the former round, the latter narrow; a deep rufous postmedial line, slightly bent outwards below costa, then waved, incurved at discal fold and strongly below vein 4; a minutely waved rufous subterminal line; cilia deep rufous. Hindwing bright orange yellow; the base and inner area suffused with black, confluent with the black discoidal lunule; a narrow black terminal band; cilia pale rufous, with dark line near base; the underside with the blackish suffusion confined to inner area.

Habitat—TIBET; SIKKIM. *Exp.* 24 mill.

NOCTUINÆ.

2300. COSMOPHILA MESOGONA.

Larva. Semi-looper. Grass green with numerous black-centred white

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

spots; dorsal and lateral stripes dark-green with pale edges. Food plant wild raspberry in the leaves of which it spins up when pupating. (W. H. Campbell).

2303*a*. Cosmophila figlina, Butl., Ill. Het. B. M. vii., p. 71, pl. 131, f. 2 (1889).

♂. Forewing with the termen slightly excurved at middle.

Head and thorax rufous tinged with brown; palpi whitish in front; lower part of frons whitish; antennæ with the basal joint whitish in front; pectus and legs yellowish tinged with rufous; abdomen grey-brown, the basal crest rufous tipped with whitish, the anal tuft tipped with white, the ventral surface yellowish tinged with rufous. Forewing yellow mixed with red, the costal area, cell, and the area from lower angle of cell to termen between vein 5 and submedian fold red-brown with a greyish tinge; a whitish mark at base of inner margin; antemedial line blackish, oblique, waved, excurved at median nervure and above inner margin; orbicular and reniform diffused brown, undefined, the former round with a white point in centre, the latter lunulate; postmedial line black, waved, oblique from costa to below vein 7, at vein 3 retracted to lower angle of cell and again excurved below submedian fold; an indistinct waved subterminal line defined on inner side by brown suffusion, incurved between veins 6 and 4 and below vein 3. Hindwing grey-brown; cilia whitish; the underside whitish with the costal half tinged and irrorated with red, a slight waved postmedial line.

♀. Forewing more uniform purplish brown.

Habitat—Punjab, Dharmsála; Assam, Khásis: Ceylon, Maskeliya. Madulsima; Burma, Rangoon. *Exp.* 38 mill.

2318. Churia arcuata. del. *Anomis figlina*.

2441*a*. Polydesma noduna; Swinh. A.M.N.H. (7), xvi., p. 152 (1905).

♀. Head and thorax dark sap-green mixed with white; pectus and legs pale red-brown, the tarsi fuscous ringed with white; abdomen pale red-brown, the ventral surface whitish. Forewing dark sap-green irrorated with white; a diffused white fascia below base of cell, the medial area whitish from below costa to above submedian fold, the postmedial costal area whitish; subbasal line defined on each side by whitish, excurved below costa and angled inwards in cell; antemedial line defined on inner side by white to submedian fold, slightly incurved from costa to median nervure, angled inwards in submedian fold, then double and excurved above inner margin; a black discoidal lunule; a rather diffused straight medial line interrupted in cell; postmedial line double filled in with white, oblique and minutely waved from costa to vein 6, inwardly oblique to submedian fold, then excurved and angled inwards on vein 1, some white points beyond it on costa; an oblique dentate white line defined by dark scales on inner side from costa near apex to submedian fold, where

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

there is a wedge-shaped blackish mark beyond it; subterminal line dentate, black defined by white lunules on inner side and connected by slight dark streak with a terminal series of faint striæ; cilia with a fine whitish line at base. Hindwing whitish suffused with glossy ochreous, the veins and terminal area dark-brown; a discoidal lunule, and sinuous postmedial line angled outwards in submedian fold; a subterminal series of white striæ; a white patch at termen and on cilia with a dark patch above it; cilia with a fine pale line at base; the underside whiter irrorated with brown, a black discoidal lunule, sinuous postmedial line, and broad dark terminal band.

Habitat—CEYLON. *Exp.* 42 mill.

2522*a*. ISOURA METAPHÆA, n. sp.

Palpi with the 3rd joint long.

♀. Head, thorax and abdomen red-brown with a purplish tinge; palpi at base, pectus, legs and ventral surface of abdomen whitish tinged with fulvous, the tarsi fuscous with pale rings. Forewing red-brown with a purplish tinge; subbasal line represented by a small black spot below costa, the antemedial line by a black striga from costa, a spot in cell nearer base, and sometimes a slight striga below submedian fold; orbicular represented by a small black spot, the reniform by black points on its inner and outer edges: a more or less incomplete minutely waved black medial line bent inwards to costa; postmedial line represented by a double series of slight black lunules with another series beyond it, bent inwards to costa, then nearly erect; an incomplete minutely waved black subterminal line slightly excurved below vein 7. Hindwing with the basal area brownish ochreous, the rest of wing fuscous brown with a diffused brownish ochreous postmedial band not reaching costa or inner margin; cilia paler; the underside ochreous white with blackish postmedial band from below costa, where it is angled outwards, to submedian fold; the terminal area suffused with fuscous.

Habitat.—CEYLON, Colombo (Mackwood), Kandy (Green). *Exp.* 44 mill. Type in B. M.

2543*b*. BOCULA SINIFERA, n. sp.

♀. Head and thorax red-brown; legs suffused with fuscous; abdomen fuscous brown, the ventral surface whitish suffused with red-brown. Forewing red-brown tinged with fuscous; two indistinct diffused incurved medial lines; a slight pale discoidal spot with minute brown lunule on it: an indistinct pale incurved postmedial line; a pale subterminal line, oblique from costa just before apex to vein 7, then excurved, then strongly bent inwards between veins 6 and 4 and excurved to inner margin near tornus, defined by black on outer side from costa to vein 4, strongly in the sinus: a terminal series of slight pale points; cilia greyish at tips. Hindwing fuscous brown, the cilia greyish: the underside greyish suffused and

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

irrorated with brown, a slight discoidal lunule and indistinct diffused curved postmedial line.

Habitat.—Assam, Khásis. *Exp.* 40 mill. Type in B. M.

2544 *b.* Bocula macoma, Swinh., A. M. N. H. (7) xviii., p. 410 (1906).

♂. Head and thorax pale rufous slightly irrorated with fuscous; palpi fuscous; forelegs and the tarsi fuscous; abdomen greyish dorsally suffused with fuscous. Forewing pale rufous slightly irrorated with fuscous; a black point on median nervure at origin of vein 2; traces of a very oblique sinuous medial line; postmedial line represented by a very oblique series of minute dark points on the veins; an oblique sinuous fuscous fascia from apex to vein 5 just beyond the postmedial line with a straight black line diffused on outer side from its extremity to inner margin near tornus, the area beyond it tinged with fuscous to the indistinct diffused sinuous subterminal line; a terminal series of small black lunules. Hindwing pale brown suffused with fuscous; the underside grey irrorated with brown, the terminal area suffused with fuscous to vein 2, a slight discoidal lunule and indistinct diffused curved postmedial line.

Habitat—Assam, Khásis. *Exp.* 28 Mill.

2555. Acantholipes hypenoides insert (Syn.) *Rivula magniplaga*, Swinh, A. M. N. H. (7) xvi., p. 622 (1900).

Genus Masca.

	Type.
Masca, Wlk., xvi. 8 (1858)	*abactalis.*
Phagytra, Wlk., xxxiv. 1508 (1865)	*abactalis.*

Probosis fully developed; palpi obliquely upturned, the 2nd joint reaching to about vertex of head and moderately scaled, the 3rd moderate; frons smooth; eyes large, rounded; antennæ of male ciliated; head and thorax clothed with hair and scales and without crests; fore femora and tibiæ of male broadly fringed with hair, the 1st joint of tarsus with tuft of hair; mid tibiæ broadly fringed with hair; hind tibiæ broadly fringed on both sides with hair and with tuft of very long hair from base; abdomen without crests. Forewing with the apex rectangular, the termen slightly angled at vein 4; veins 3 and 5 from near angle of cell; 6 from upper angle; 9 from 10 anastomosing with 8 to form the areole; 11 from cell. Hindwing with veins 3·4 from angle of cell; 5 from above angle; 6·7 from upper angle; 8 anastomosing with the cell near base only.

2616a. Masca abactalis, Wlk., xvi., 9 (1858).

Phagytra leucogastralis, Wlk., xxxiv., 1508 (1865).

Metria platypoda, Feld., Reis. Nov., pl. 120, f. 44 (1873).

Head and thorax white mixed with reddish-brown; antennæ ringed brown and white; hindlegs with the tufts of hair black at tips; abdomen

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

white with lateral brownish streaks. Forewing with the basal half white tinged and irrorated with brown; the terminal half suffused with fuscous brown; traces of an oblique antemedial line with more prominent spots below the cell and above inner margin; an obscure very oblique dark spot in middle of cell and discoidal spot constricted at middle; the dark terminal area angled inwards below the cell; a minutely dentate postmedial line bent outwards below costa, oblique below vein 4, and angled inwards in submedian fold; two subterminal white points near apex and traces of a subterminal line; a terminal series of dark striæ. Hindwing white, the terminal half of costal area broadly fuscous, on terminal area extending to vein 3; a postmedial series of minute black streaks on veins 5 to 1; a terminal series of black striæ; the underside thickly irrorated with fuscous brown except inner area and terminal area below vein 5, a black discoidal point, curved diffused medial brown band and double postmedial series of brown points.

Habitat.—Assam, Khásis; Singapore; Borneo: Philippines; Java: Amboina; Ceram; New Guinea. *Exp.* 46 mill.

2747*a*. Egnasia mesotypa, Swinh., A.M.N.H. (7), xvii., p. 550 (1906).

Head, thorax and abdomen dull reddish brown; palpi irrorated with fuscous, the tuft on 3rd joint black; pectus and ventral surface of abdomen greyish irrorated with fuscous. Forewing dull reddish brown tinged with grey and irrorated with fuscous; a dark oblique antemedial line, incurved in cell; a small round white spot in middle of cell defined by fuscous; an inverted comma-shaped discoidal whitish mark defined by fuscous and with reddish spot in lower part; a dark postmedial line oblique from costa to vein 6, then minutely waved, oblique below vein 5 and with traces of another line beyond it; a curved dentate subterminal line; a fine black terminal line; cilia brown at base, whitish at tips except at middle. Hindwing dull reddish brown tinged with grey and irrorated with fuscous: a whitish discoidal mark defined by black, its outer edge twice indented and with small round spot beyond its lower extremity; a dark slightly sinuous medial line; a dentate subterminal line; a fine black terminal line; cilia brown at base, whitish at tips, intersected by brown at the points; the underside paler with indistinct diffused line beyond the medial line.

Habitat.—Assam, Khásis. *Exp.* ♂ 24, ♀ 30 mill.

2748*a*. Egnasia tenella, n. sp.

♂. Head, thorax and the abdomen creamy white, back of head with two brown points, the thorax slightly irrorated with brown, the abdomen faintly tinged with brown; palpi with the extremity of 2nd joint and the 3rd joint ringed with brown; tarsi brownish ringed with white. Forewing creamy white slightly irrorated and striated with brown; a curved subbasal brown striga from costa; antemedial line brown, waved: the discocellulars with

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

two brown striæ and two blackish points; a faint medial line excurved to discocellulars; postmedial line brown, excurved from costa to vein 4, then slightly incurved; two minute dark streaks on costa towards apex and traces of a minutely waved white subterminal line with series of blackish points on its outer edge; a fine brown terminal line; cilia tinged with rufous. Hindwing creamy white slightly irrorated with brown; a black discoidal point enclosed by the faint medial line which forms an elliptical annulus round it; a curved brown postmedial line; subterminal line represented by a double series of small brown spots except towards costa, with whitish points between them; a fine brown terminal line; cilia tinged with rufous.

Habitat.—Burma, Maymyo. *Exp.* 26 mill. Type in B. M.

2762*a*. Capnodes subapicalis, Swinh., A.M.N.H. (7), xvi., p. 154. (1905).

♀. Head and thorax fuscous irrorated with white, tibiæ and tarsi pale rufous; abdomen pale rufous dorsally irrorated with fuscous and whitish. Forewing pale rufous irrorated with a few black scales; a blackish patch at base of costa; a black point in middle of cell; an indistinct medial line, strongly incurved below the cell; two black discoidal points edged with whitish; an indistinct dentate rufous postmedial line, oblique towards costa and strongly incurved below vein 4; traces of a waved subterminal line towards tornus; a semicircular brown line from below costa towards apex to termen at vein 5, defined by white on outer side, and connected by diffused fuscous streaks with small subterminal black spots defined by white, below this semicircular patch is a series of black points before termen; a fine black terminal line; cilia marked with fuscous towards apex and with fine black line near tips. Hindwing pale rufous irrorated with a few black scales; two obliquely placed black discoidal points; a minutely waved rufous line from below middle of costa to tornus with a black spot beyond it at tornus; a series of black points just before termen; a fine dark terminal line; the underside yellowish white irrorated with rufous, two discoidal black points, a curved dentate rufous postmedial line, and series of black points just before termen.

Habitat.—Assam, Silchar; Cachar. *Exp.* 36 mill.

2772. Raparna digramma.

Larva.—Fuscous thickly spotted with pale green; intersegmental olive-green bands; an olive-green dorsal stripe with spots on it; an interrupted subspiracular pale green line; the 12th somite somewhat swollen, with an orange band; ventral surface dull green; head flat, bright red; four pairs of prolegs. Food plant. *Ochna squarrosa*, 5. (W. H. Campbell.)

Hypeninæ.

2819*b*. Bleptina heteropalpia, n. sp.

Antennæ of male minutely serrate and with fascicles of long cilia, some-

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

what contorted and fringed with scales above at middle; palpi with the 3rd joint long, from outer extremity of 2nd, oblique, bent forward at extremity, fringed with long hair behind and short scales in front; fore tibia without sheath; forewing with large costal fold on underside.

♂. Head and thorax fuscous brown mixed with grey; tarsi with slight pale rings; abdomen grey suffused with fuscous brown. Forewing grey tinged with brown and irrorated with black; an indistinct sinuous black antemedial line; a diffused black medial shade not extending to costa; reniform whitish with brown centre, elliptical; postmedial line diffused, blackish, incurved below end of cell; subterminal line indistinct, whitish defined on inner side by blackish suffusion, angled outwards at vein 7 and with blackish patch before it, excurved at middle; a terminal series of black points. Hindwing whitish tinged with brown, traces of a diffused antemedial line and curved postmedial and subterminal lines; a terminal series of black striæ; the underside whitish irrorated with brown, a black discoidal lunule, the postmedial and subterminal lines more distinct.

Habitat.—Madras, Palnis (Campbell). *Exp.* 28 mill. Type in B. M.

2828. Bleptina triangulifera insert (Syn), *Macna prætextata*, Hering Stett. Ent. Zeit. xliv., p. 98, pl. 1, f. 1 (1903).

2833*b*. Mastigophorus indentifascia, Swinh., A. M. N. H. (7) xvii., p. 283 (1906).

Fuscous brown; palpi with the tuft of hair on inner side ochreous; tarsi ringed with whitish. Forewing with the area to postmedial line greyish fuscous; antemedial line represented by slight dark suffusion; a small deep black spot in middle of cell and rather large deep black discoidal lunule; postmedial line fuscous defined by greyish on outer side, excurved from costa to vein 4, then incurved and minutely waved, subterminal line grey, angled inwards at discal fold and incurved in submedian interspace; a terminal series of slight black lunules. Hindwing with small blackish discoidal spot, postmedial line fuscous defined by grey on outer side, minutely waved, excurved at middle; subterminal line greyish, obsolete towards costa, excurved from vein 6 to 3, then incurved; a terminal series of black striæ; the underside grey irrorated with fuscous, the terminal area suffused with brown, a black discoidal spot, curved minutely waved medial line and pale curved subterminal line defined on each side by fuscous.

Habitat.—Bhutan; Assam, Khásis. *Exp.* 40 mill.

Under Mastigophorus insert *Oxænanus*, Swinh. Cat. Het. Mus. Oxon, ii. p. 201 (1900) for Sect. ii. Type *brontesalis*.

2838*a*. Mastigophorus magniplaga, Swinh., A. M. N. H. (7) xvi, p. 624 (1905).

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

♂. Red brown. Forewing with black point at base of costa and subbasal point below the cell, an indistinct pale antemedial line slightly bent inwards to costa, with black point before it in cell and spot beyond it on costa: a large rounded black discoidal patch truncate above and defined by ochreous, with dark brown patch above in on costa and slight oblique pale band beyond it touching its outer edge; postmedial line very indistinct. dark, minutely crenulate, excurved from costa to vein 4, then oblique, a diffused dark patch beyond it on costa; a terminal series of black points. Hindwing with indistinct diffused pale postmedial band with the slight curved brown postmedial line on it; a slight dark terminal line; the underside greyish brown with small black discoidal spot, minutely crenulate postmedial line, and indistinct minutely crenulate subterminal line.

Habitat.—Sikhim; Assam, Khásis. *Exp.* 42 mill.

2868*b*. Nodana discosticta, n. sp.

Antennæ of male knotted and contorted at middle; fore tibia with the sheath covering the basal joint of tarsus only, fore and hind legs with a large tuft of hair from femero-tibial joint.

♂. Head, thorax and abdomen ochreous brown tinged with purplish grey; legs with the tufts ochreous. Forewing brown mixed with purplish grey and with slight dark irroration, the costal edge darker; subbasal line blackish, from costa to median nervure; antemedial line black, minutely waved, bent inwards to costa: a round black discoidal spot; postmedial line black, minutely dentate, excurved from costa to vein 4, then incurved, subterminal line whitish, defined on each side by fuscous, almost straight; a terminal series of black points; cilia with a fine pale line at base. Hind wing grey suffused with brown; an indistinct discoidal bar and straight postmedial line from vein 6 to inner margin; subterminal line whitish defined on inner side by fuscous, the white not extending to costa, almost straight from costa to submedian fold where it is angled; a terminal series of black points; cilia with a pale line at base; the underside whitish irrorated with brown, a black discoidal lunule, the postmedial line slightly angled outwards at vein 6 and inwards at discal fold, the subterminal line diffused and slightly angled at veins 5 and 2.

♀. Rather deeper ochreous brown.

Habitat.—Ceylon, Kandy (Green), Peradeniya (Green). *Exp.* 34 mill. Type in B. M.

Genus Pilipectus.

Type.

Pilipectus, Beth-Bakn. A. M. N. H. (8) vi., p. 443 (1910) ..... *ocellata.*

Proboscis fully developed; palpi upturned, the second joint reaching to about vertex of head and moderately fringed with hair in front, the 3rd long and slender; fronts smooth, with tuft of hair; eyes large, round:

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

antennæ of male ciliated; thorax clothed with scales mixed with long hair, the tips of patagia with very long hair, without crests; mid tibiæ moderately fringed with hair, the hind tibiæ fringed on both sides with long hair, the inner spurs very long; abdomen with some long hair at base and crest on basal segment. Forewing with the apex rounded, the termen rather oblique below vein 4, not crenulate, the inner margin with numerous scale-teeth of scales and long hair; vein 3 from before angle of cell; 5 from above angle; 6 from just below upper angle; 9 from 10 anastomosing with 8 to form the areole; 11 from cell. Hindwing with veins 3·4 from angle of cell; 5 fully developed from just above angle; 6·7 from upper angle; 8 anastomosing with the cell near base only.

2874*b*. PILIPECTUS CYCLOPIS, n. sp.

♂. Head and thorax ochreous white tinged with rufous and mixed with chocolate-brown scales; pectus and legs white, the latter suffused with brown; abdomen white dorsally tinged with brown, the crest at base brown. Forewing covered with fine chocolate-brown and white striæ and with numerous coarser white striæ, the basal half with the dark markings blackish; the veins whitish, antimedial chocolate-red marks above and below vein 1; a chocolate-red patch suffused with plum-colour beyond the cell, an orange spot on its lower part with white point above it, divided by whitish striæ from a semicircular chocolate-red patch defined by whitish beyond it, its middle part suffused with plum-colour and with some white in centre, two fine dark streaks above it below costa; the apex pale rufous without striæ; the termen with blackish marks irrorated and striated with white, the three towards apex small triangular spots, a large triangular patch at vein 5, wedge-shaped patch below vein 3, and rounded patch above tornus. Hindwing white, the apical area suffused with brown. Underside of forewing brown, the tornal area white.

♀. Hindwing almost wholly suffused with brown, the cilia white slightly tinged with brown.

Habitat.—CEYLON, Haldamulla (Mackwood), Matale (Pole); SINGAPORE; BORNEO, Sarawak. *Exp*. 44 mill.

No. 1497. *Cacyparis prunifera*, Swinh. from Sikhim belongs to this genus, the forewing has the outer part of the postmedial patch extending from just below costa to below vein 3 and with yellow marks on it in the interspaces except between veins 6 and 5; *P. ocellata*, B.-Baker. from New Guinea has the fuscous on termen of hindwing in male extending to tornus.

1407*j*. TOLPIA ARGENTESCENS, n. sp.

Head, thorax and abdomen brownish ochreous with a slight silvery gloss; palpi blackish except at tips; tarsi blackish ringed with white. Forewings ochreous with a slight silvery gloss irrorated with rufous, the terminal area suffused with rufous, the costa dark-brown to middle where it expands into a patch; subbasal line represented by a black striga from costa and a point

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

in cell; antemedial line brown, oblique from costa to a small black spot in middle of cell, then erect, waved; medial line brown with small black spot on costa, erect, sinuous, with a small white discoidal spot on its outer edge; postmedial line red-brown defined on outer side by whitish, oblique to vein 6, slightly incurved at discal fold, then excurved, incurved below vein 4; subterminal line whitish defined on inner side by red-brown, excurved below vein 7 and at middle; some black striæ on costa towards apex and on termen. Hindwing ochreous white tinged with brown; a fine brown terminal line; the underside with the costal area suffused with brown, a blackish discoidal striga.

Habitat.—CEYLON, Kandy (Green). *Exp.* 14 mill. Type in B. M.

2904*c*. MARAPANA CAUTIPERAS, n. sp.

Head and thorax white mixed with grey-brown; palpi with the 2nd joint red-brown at sides, the 3rd with fuscous ring near tips; frons red-brown at sides; forelegs fuscous in front; abdomen white dorsally suffused with rufous except at base, the basal crest red-brown. Forewing white tinged with rufous, the costal area suffused with brown towards base; a large quadrate patch of red-brown mixed with fiery red and grey on terminal part of costal area, extending down to vein 4 and on inner part to vein 3; subbasal line white, excurved below costa and ending at submedian fold; antemedial line white slightly defined on inner side by rufous, angled outwards at subcostal and median nervures, then oblique; traces of a waved brown medial line; postmedial line white, very oblique and sinuous to vein 4, then inwardly oblique, some white points beyond it on costa; subterminal line white with diffused white patch before it at costa and defined on outer side by brown on the dark area, angled outwards at veins 7 and 4 and slightly incurved at submedian fold, where there is a rufous point on its outer edge; a series of black points just before termen; a fine black terminal line. Hindwing whitish suffused with brown; a dark discoidal point; a whitish postmedial line; traces of a sinuous punctiform subterminal line, a series of black points just before termen and a fine black terminal line; cilia pure white; the underside white irrorated with fuscous, a black discoidal spot, indistinct rufous postmedial line, faint punctiform subterminal line, and series of black points before termen.

Habitat.—CEYLON, Kandy (Mackwood); SINGAPORE (Ridley). ♀. *Exp.* 34 mill. Type in B. M.

2904*d*. MARAPANA DIPLOGRAMMA, n. sp.

♂. Head and tegulæ red-brown slightly tinged with grey; thorax and abdomen grey-brown. Forewing grey-brown suffused with reddish brown on basal costal area, beyond the antemedial line, on postmedial area except towards inner margin, and on terminal area; subbasal line pale, inwardly oblique, from costa to submedian fold; antemedial line double filled in with whitish, erect, slightly incurved in cell; a double discoidal

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

bar filled in with whitish; postmedial line double filled in with whitish, oblique below vein 4; an oblique grey-white shade from costa before the subterminal line which is indistinctly double filled in with whitish, slightly incurved at discal fold, excurved at middle, and incurved below vein 4. Hindwing grey suffused with fuscous brown; an indistinct postmedial line; cilia pale rufous; the underside whitish irrorated with reddish brown, a dark discoidal lunule, somewhat diffused sinuous postmedial line, and series of points just before termen.

Habitat.—CEYLON, Ambalangoda (Pole). *Exp.* 22 mill. Type in B. M.

2915*b*. RHYNCHINA LEUCOGONIA, n. sp.

♀. Head and thorax brown mixed with grey-white, the metathoracic crest tipped with black; abdomen whitish suffused with brown, the basal crest tipped with black; pectus and ventral surface of abdomen white irrorated with brown. Forewing whitish tinged with purple and suffused with brown and irrorated with black; a diffused whitish fascia above vein 1 to postmedial line where it is met by an oblique whitish band from apex; antemedial line very indistinct, excurved below costa, then oblique and angled inwards on vein 1; a white point at lower angle of cell; postmedial line indistinct, double, angled outwards below costa, then very oblique, some white points beyond it on costa; subterminal line slight, dark, dentate with black streaks, before it below veins 7, 6, defined by whitish on inner side below vein 5, with a slight black mark at submedian fold, then with a pure white lunule before it; a terminal series of black points; cilia with slight white lunules in the crenulations. Hindwing reddish brown; the underside whitish tinged with red-brown, a slight discoidal lunule and indistinct curved postmedial line.

Habitat.—MADRAS, Horsleykonda (Campbell). *Exp.* 34 mill. Type in B.M.

2928*b*. HYPENA THERMOPHÆA, n. sp.

♂. Head and thorax dark red-brown; palpi whitish at base and as tip of 3rd joint; pectus and base of legs whitish; tarsi fuscous ringed with whitish; abdomen grey-brown tinged with rufous, the basal crest tipped with grey, the ventral surface whitish. Forewing dark red-brown irrorated with black; an indistinct waved rufous antemedial line defined by ochreous on inner side; obscure blackish spots at middle of cell and on discocellulars; postmedial line rufous slightly defined by ochreous on outer side, minutely waved, oblique from costa to vein 4, then incurved; a subterminal series of slight black points, and a terminal series. Hindwing uniform reddish brown with a cupreous gloss; the underside with the inner half greyish.

Habitat.—BOMBAY, Ratnagiri (Jayakar). *Exp.* 30 mill. Type in B. M.

2929*a*. HYPENA MESOGRAMMA, n. sp.

♀. Head and thorax black-brown mixed with grey; palpi whitish below; antennæ ringed with whitish; pectus whitish; tarsi fuscous ringed

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

with white; abdomen black-brown mixed with grey and with whitish segmental lines, the crests blackish, the ventral surface whitish. Forewing reddish brown mixed with some grey and thickly irrorated with black, the terminal area darker; points of raised black scales with whitish scales in centre at middle of cell and on discocellulars; the postmedial line almost medial, oblique, whitish, defined on inner side by rufous, then by some black scales, some grey points beyond it on costa; subterminal line indistinct, oblique and blackish from costa to vein 6 where it is met by an oblique black streak from apex, then greyish, slightly incurved at discal fold and strongly at submedian fold, a terminal series of black striæ. Hindwing fuscous brown with a greyish tinge; a terminal series of black striæ; cilia whitish at tips; the underside whitish irrorated with red-brown, a blackish discoidal point and terminal series of minute black lunules.

Habitat.—Madras, Gooty (Campbell). *Exp.* 16 mill. Type in B. M.

2985*b*. Hypena molybdota, n. sp.

♂. Head and thorax glossy black-brown; abdomen pale brown; palpi white at tips; tarsi ringed with white. Forewing black-brown with a leaden gloss and irrorated with a few white scales; antemedial line black from median nervure to inner margin, waved; a minute rufous spot defined by black in upper part of middle of cell, reniform small, triangular, rufous defined by black; a waved medial shade from lower angle of cell to inner margin; postmedial line black, minutely waved, excurved below costa and at middle, angled inwards at discal fold, incurved below vein 3 and excurved above inner margin, subterminal line white, minutely waved slightly excurved below vein 7 and at middle; a terminal series of minute black lunules defined on inner side by white scales. Hindwing fuscous; a slight waved black postmedial line on inner area; subterminal line whitish, incurved at vein 2; a terminal series of black points; the underside whitish thickly irrorated with fuscous brown, a small discoidal spot, indistinct dark waved postmedial line, and waved whitish subterminal line defined on outer side by fuscous.

Habitat.—Madras, Palnis (Campbell); Travancore, Pirmád (Mrs. Imray). *Exp.* 30 mill. Type in B. M.

2985*b*. Hypena atrirena, n. sp.

♀. Head, thorax and abdomen reddish brown tinged with grey; palpi black-brown, white at tips; sides of frons black-brown; forelegs tinged with fuscous. Forewing grey suffused with reddish brown; antemedial line indistinct, dark, oblique, waved; a whitish point in middle of cell; reniform black defined by some whitish scales, attenuated above and rounded below; postmedial line slight, dark, minutely dentate, slightly bent outwards below costa and incurved at discal fold and below vein 4; subterminal line indistinct, pale, minutely waved, excurved below vein 7

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

and at middle ; a terminal series of black striæ. Hindwing grey suffused with brown ; traces of antemedial and medial lines ; a terminal series of dark striæ ; the underside with slight dark discoidal bar and traces of waved postmedial and subterminal lines.

Habitat.—Ceylon, Wellawaya (Green). *Exp.* 22 mill. Type in B. M.

2988*a*. Hypena abnormalis, n. sp.

Palpi of male with tuft of ochreous hair from 1st joint in front, the 2nd joint with tuft of long hair from base above, curved forward before the fringe of hair ; antennæ serrate and fasciculate ; the cell with fold on underside containing a tuft of long yellow hair ; the fore coxæ and femora with tufts of hair, the fore tibia with small streak covering the base of torsus.

♂. Head and thorax fuscous brown; abdomen whitish tinged with brown. Forewing grey suffused with reddish brown and irrorated with fuscous ; traces of an erect dark antemedial line ; postmedial line dark, excurved below costa and at middle and incurved at discal fold and below vein 4 ; faint traces of a dark subterminal line, angled outwards at vein 7 ; a terminal series of black points. Hindwing white faintly tinged with brown except the costal area to beyond middle, the inner area strongly tinged with brown ; the underside white slightly irrorated with brown, a dark discoidal point and terminal line from apex to vein 2.

Habitat.—Ceylon, Hatigala (Green). *Exp.* 28 mill. Type in B. M.

2990. Britha biguttata insert (syn.) *Hypena colabalis*, Feld., Reis. Nov., pl. 120, f. 29 (1874).

2996*b*. Chusaris rubrirena, n. sp.

♀. Head, throax and abdomen rufous mixed with some ochreous white ; palpi with some black on outer side of 2nd joint at base and extremity, the 3rd joint white with black ring near extremity ; tarsi banded with black. Forewing ochreous suffused with rufous and irrorated with brown especially on costal area ; a brown antemedial mark on costa with traces of the antemedial line arising from it, oblique, sinuous ; reniform oblique, with red centre defined by black except above and whitish bar before it, some dark suffusion beyond it and a blackish striga above it from costa ; postmedial line white and oblique from costa to vein 6, then obsolescent, strongly angled inwards in submedian fold, a blackish patch beyond it on costa ; subterminal line white slightly defined on inner side by red suffusion, angled inwards below costa and at discal fold, the area beyond it suffused with red and with slight diffused black streaks from below costa to vein 4 ; a terminal series of small black spots defined on inner side by white lunules ; cilia white with some black at apex and middle and black line through them between those points. Hindwing blood-red, the terminal area tinged with brown ; a slight dark discoidal point, indistinct curved white postmedial line with slight oblique black striga before it at inner margin, and subterminal series of slight dark spots towards tornus

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

with oblique black striga on a white mark before them above inner margin; a series of blackish points just before termen; cilia whitish with blackish line near tips from apex to discal fold; the underside whitish suffused with rufous, traces of waved red medial and postmedial lines, and of a waved white subterminal line defined on inner side by brown and on outer side towards costa, a terminal series of black lunules.

Habitat.—CEYLON, Kegalle (Alston). *Exp.* 18 mill. Type in B. M.

3008*b*. HYPENAGONIA FLAVISIGNA, n. sp.

Palpi projecting about one and a half times length of head.

♀. Head, thorax and abdomen dark-brown mixed with grey; palpi with oblique pale band on 2nd joint. Forewing dark-brown mixed with grey; a slight dark subbasal line, angled outwards below costa, then oblique; a slight dark antemedial line, obliquely excurved from costa to median nervure, then oblique; an oblique diffused medial black band from upper angle of cell to inner margin; a minute whitish discoidal lunule; postmedial line indistinct and whitish on costal half, yellowish on inner half, bent outwards below costa and incurved below vein 4, a irregular yellow mark with slight black marks on its edges beyond it between veins 6 and 4, and some white points on costa; a subterminal series of small triangular black spots with white striæ on their inner side; cilia mixed with white at tips. Hindwing grey and yellowish thickly irrorated with dark-brown; a black medial band from upper angle of cell to inner margin; a maculate black postmedial line with some yellow before it; an indistinct blackish subterminal line; a series of black striæ slightly defined on inner side by grey just before termen; a fine black terminal line; cilia mixed with white at tips; the underside white mixed with some yellow and thickly irrorated with black, a small black discoidal spot, medial and postmedial lines, and diffused subterminal shade.

Habitat.— CEYLON, Kalutava (Alston). *Exp.* 16 mill. Type in B. M.

3008*c*. HYPENAGONIA LONGIPALPIS, n. sp.

Palpi projecting about three times length of head, the 3rd joint upturned and tufted with hair at middle.

Head, thorax and abdomen yellowish mixed with rufous and a few black scales; palpi with oblique black line near extremity of 2nd joint, the 3rd joint with black band at middle; tegulæ with some black at tips; tarsi ringed with black. Forewing yellowish mixed with rufous and irrorated with black; a slight waved black subbasal line from costa to median nurvure; a fine minutely waved black antemedial line; a brown medial band edged by slight dark lines, the outer edge slightly angled outwards at lower angle of cell below the minute white discoidal lunule; postmedial line fine, black defined on outer side by white, oblique from costa to vein 6, slightly angled inwards at discal fold, incurved and minutely waved below vein 4, the costa beyond it with alternating black and whitish

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

streaks; the postmedial area with curved series of black points and in female a rounded spot in discal fold with diffused streak from its outer edge to tips of cilia; a subterminal series of small black spots, excurved at middle; a fine waved black terminal line; cilia with whitish line at base of cilia. Hindwing yellowish and white mixed with rufous and irrorated with black; a brown medial band from below costa to inner margin, edged by blackish lines; a postmedial series of black points with minute yellowish lunules on their outer sides; a subterminal series of small black spots defined on inner side by whitish; a fine waved black terminal line; cilia with a whitish line at base and black line at middle; the underside with waved black medial, postmedial and subterminal lines, black discoidal bar, and series of small spots before termen.

Habitat.—Ceylon, Puttalam (Mackwood), Haputale (Alston). *Exp.* 18 mill. Type in B. M.

3008*b*. Hypenagonia brachypalpia, n. sp.

Palpi projecting about the length of head.

♀. Head, thorax and abdomen white; palpi and hinder part of thorax tinged with rufous; fore femora and tibiæ tinged with fuscous; abdomen with rufous band at base and slight fuscous bands towards extremity. Forewing white tinged with rufous except on costal area; antemedial line with black point at costa, then slight, rufous, incurved in cell and excurved in submedian interspace; two black discoidal points; a rather diffused oblique rufous line from lower angle of cell to inner margin; postmedial line fine, brown, with black point at costa, strongly bent outwards below costa, then oblique, slightly incurved at discal fold and somewhat sinuous below vein 4; two slight black streaks on costa towards apex; subterminal line slight, whitish, slightly angled inwards below costa and with rufous mark on its outer edge at middle; a terminal series of black striæ with small rather dentate white marks before them; cilia with fuscous spot at middle. Hindwing white; a diffused rufous antemedial line except on costal area; a black discoidal spot; the medial area with some fuscous irroration; an inwardly oblique dark line from costa towards apex to discal fold; a double very minutely waved subterminal line, the inner line blackish, the outer brown and rather diffused towards apex; a fine black subterminal line except at apex; the underside white slightly irrorated with fuscous, a black discoidal point and slight sinuous postmedial line.

Habitat.—Ceylon, Labugama (Mackwood). *Exp.* 14 mill. Type in B. M.

3014*a*. Mecistoptera albisigna, n. sp.

♂. Head and tegulæ brownish white, the palpi brown irrorated with black, the frons with brown lateral bars, some brown between antennæ and two black points at back of head, the tegulæ black at middle and tips; thorax and abdomen grey-brown irrorated with a few black scales. Forewing grey-brown irrorated with a few black scales; traces of a strongly

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

excurved antemedial line; orbicular near end of cell, round, defined by black except below; a comet-shaped mark at end of cell, its upper extremity extending to near costa and its lower to near postmedial line above vein 3, defined by black except above, a white spot on its inner side on discocellulars, a white line on its outer edge and some rufous in centre, some black suffusion beyond it and a slight white streak above its upper extremity; postmedial line black, dentate, oblique from costa near apex to vein 3, angled outwards at vein 7 and inwards at discal fold, a fuscous mark below vein 2; some white points on costa towards apex; subterminal line slight, grey defined on inner side by black striæ, excurved at middle, and angled inwards at discal and submedian folds; a fine waved black terminal line with an ochreous white mark before it below vein 3 and black-brown spot below 2. Hindwing fuscous brown, the cilia whitish; the underside grey thickly irrorated with brown, a slight dark discoidal striga and indistinct pale curved postmedial line.

Habitat.—MADRAS, Horsleykonda (Campbell). *Exp.* 24 mill. Type in B. M.

2103*a*. RIVULA COGNATA, n. sp.

Mid and hind tibiæ of male fringed with long hair on outer side, the mid tibia with fold containing a tuft of long hair; abdomen with lateral tufts of hair near base meeting ventrally; hindwing with the termen deeply excised at submedian fold, the tornus lobed, the inner area with a fold containing a tuft of black scales on upperside just beyond middle.

♂. Head and thorax red-brown, the patagia ochreous white; pectus and legs ochreous white; abdomen dark-brown mixed with some grey. Forewing ochreous white irrorated with dark-brown, the terminal area suffused with red-brown, the costa dark-brown; subbasal line represented by a whitish striga from costa; antemedial line whitish, angled inwards in cell, then with a large patch of black-brown suffusion before it; a whitish discoidal point on a diffused brown spot; postmedial line whitish slightly defined on inner side by brown, bent outwards below costa near apex, then minutely waved, oblique and incurved below vein 4, some oblique white striæ beyond it from costa; subterminal line represented by a small wedge-shaped whitish mark from costa with black point at its apex, then by a series of black points with whitish points on their inner side and by a whitish striga at tornus. Hindwing fuscous brown; a slight whitish line at base of cilia; the underside ochreous white irrorated with brown, a slight dark discoidal spot and indistinct postmedial line from costa to vein 4.

♀. Thorax and ground colour of forewing uniform red-brown.

Habitat.—BOMBAY, N. Kanara, Karwar (Bell); CEYLON, Kandy (Green). *Exp.* 18 mill. Type in B. M.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

The structure of *R. basalis* is similar, but the postmedial line of forewing is straight from below apex to inner margin.

2103*b*. RIVULA SIMULATRIX, n. sp.

Structure of male similar to *R. basalis* and *cognata*, but abdomen and hindwing normal.

♂. Head, thorax and abdomen pale ochreous yellow. Forewing pale ochreous yellow, the terminal area tinged with rufous; antemedial line whitish defined on outer side by a fine brown line and on inner by rufous suffusion except at costa, excurved from costa to submedian fold, then oblique; a whitish point at upper angle of cell on a diffused rufous spot; postmedial line whitish slightly defined on each side by brown, strongly bent outwards below costa, then oblique, straight, some oblique whitish striæ beyond it from costa; subterminal line represented by a whitish striga from costa, then by a series of black points with whitish points on their inner side and a whitish striga at tornus. Hindwing ochreous white tinged with brown especially on terminal area, a fine dark terminal line; the underside ochreous white irrorated with red-brown.

♀. Head, thorax and abdomen red-brown; forewing entirely suffused with red-brown, with deep red-brown suffusion before antemedial line; hindwing dark red-brown, the cilia rufous.

Habitat.—CEYLON, Dickoya (Green), Pundaloya (Green), Nawalapitiya (Pole). *Exp.* 18-20 mill. Type in B. M.

2103*d*. RIVULA PROCRITA, Swinh. A. M. N. H. (7), xvi., p. 621 (1905).

Forewing with vein 10 absent or very short.

♀. Head and thorax white or pale brown mixed with dark red-brown; palpi, pectus, and legs brown, tarsi blackish slightly ringed with white; abdomen fuscous, whitish at base. Forewing white or pale brown slightly irrorated with brown; a red brown patch on costa near base with the indistinct irregularly waved antimedial line arising from its outer edge and expanding into a patch at inner margin; a medial red-brown band expanding into a triangular patch at costa, narrowing at lower angle of cell and expanding into a wedge-shaped patch at median nervure with a >-shaped black mark on it; postmedial line arising from outer edge of the band, bent outwards below costa, incurved below vein 4 and joining the band at inner margin; terminal area red-brown with two white points on costa, an indistinct blackish subterminal line excurved below vein 7 and at middle, a white spot beyond it at apex with five black marks below it and some small white spots towards tornus; a terminal series of black points with white striæ on their inner sides. Hindwing fuscous brown with a slight pale line at base of cilia; the underside whitish tinged with brown, the terminal area suffused with brown, a fuscous discoidal lunule and curved postmedial line.

Habitat.—ASSAM, Khásis; BALI. *Exp.* 22 mill.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

URANIADÆ.

3045*d*. EPIPLEMA FULVIHAMATA, n. sp. (pl. G., f. 14).

Forewing with the termen very slightly angled at vein 6, hindwing with the costa excised beyond middle and produced to points at veins 6 and 4. Head and thorax red-brown tinged with purplish grey; palpi above and frons black; pectus and legs whitish, the forelegs fuscous above; abdomen grey tinged with brown, the medial segments with blackish dorsal marks. Forewing greyish suffused with purple-brown and striated with blackish; traces of an interrupted waved antemedial line bent inward to costa; postmedial line double tinged with fulvous and oblique from costa to vein 5, then indistinct, pale, and incurved from vein 4 to submedian fold, then defined by black on inner side and slightly excurved; a terminal black point below apex, then a dark band with diffused black and fulvous on its inner edge, angled outwards at vein 6 and ending on termen at vein 2. Hindwing with the costal half purplish, the inner half purplish grey-brown striated with black; a fulvous streak in lower part of cell hooked on discocellulars and with some black beyond its angle; post-medial line ochreous, defined on inner side by brown from costa to discal fold and below vein 4 by black and fulvous, oblique and slightly sinuous from costa to vein 4 where it is acutely angled outwards, then nearly straight; a whitish line from termen at vein 7 to termen at vein 2, defined by black on outer side and produced to termen as short white streaks at discal fold and veins 4·3; the underside brownish white slightly striated with black.

Habitat.— CEYLON, Kandy, Peradeniya (Green); PULO LAUT (Doherty). *Exp*. 22 mill. Type in B. M.

GEOMETRIDÆ.

BOARMIANÆ.

3148*a*. SYNEGIA CONFLAGRATA, n. sp.

♀. Head, thorax and abdomen fiery red mixed with yellow; palpi brownish; frons yellow below and with red and brown bars above; antennæ brown, the shaft above and a line between their bases pure white; pectus and legs ochreous and brownish, the forelegs brown; ventral surface of abdomen whitish. Forewing yellow and fiery red almost entirely suffused with fuscous brown, leaving some of the ground colour at base, as irroration on medial costal area, as ante and postmedial patches on inner margin, as a semicircular patch on termen from apex to vein 4, and lunulate spots towards tornus; an interrupted red and yellow antemedial line, excurved below costa; a postmedial white spot in submedian fold at the apex of the patch on inner margin; some brown striæ on termen; cilia yellow intersected with brown towards apex and at middle. Hindwing yellow suffused with fiery red; some brown at base; a dark discoidal point

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

with the indistinct sinuous brown medial line just before it; postmedial line double, fiery red filled in with yellow, waved; a strong brown subterminal line, angled outwards to termen at discal fold and produced as streaks to termen at veins 4, 3, 2; the underside ochreous, a brown subbasal line except towards costa, medial line brown, waved, double towards inner margin, the discoidal point just beyond it, postmedial line brown, curved, waved, the subterminal line connected at discal fold with a lunulate patch on termen.

Habitat.—Madras, Nilgiris (Andrewes). *Exp.* 36 mill. Type in B. M.

3235. Macaria Subalbataria.

Larva.—Bistre brown; two black dorsal lines with a white line between them; two fine lateral black lines; ventral surface paler; head bistre brown with black spots. 6 (W. H. Campbell).

3236*a*. Macaria honoria, n. sp.

Head and thorax dark-brown mixed with some grey; palpi ochreous at base and white at tips; frons with white points at sides, antennæ with the basal point white in front; pectus yellow, legs yellow irrorated with brown, the tibiæ and tarsi brown above; abdomen yellow, dorsally dark-brown except at extremity. Forewing purplish grey irrorated and striated with dark-brown, the basal and costal areas suffused with brown, the medial area pale grey except towards costa; an oblique antemedial dark-brown bar from costa; a small black-brown discoidal spot; postmedial line dark-brown, strong oblique and slightly sinuous to vein 7, then bent inwards to discal fold, then slightly oblique, a patch of black-brown above its angle on costal area, then a band of dark-brown suffusion beyond it emitting a diffused fascia from the angle of the line to termen; a terminal series of black-brown points; cilia brownish with white line at base, chequered with dark-brown towards apex. Hindwing purplish grey striated with brown; the basal area suffused with brown, a whitish subbasal spot in cell, its outer edge incurved before the small round black discoidal spot placed on the paler medial area; postmedial line blackish, almost straight, a broad band of brown suffusion beyond it and rather wedge-shaped black patches between veins 6·7 and 4·3, the former extending at extremity to discal fold; the terminal area with dark-brown patch between veins 6 and 4; a terminal series of slight dark lunules; cilia whitish at base, brownish at tips, dark between veins 6 and 4. Underside of both wings with the basal area pale striated with brown, the terminal area fuscous brown with white subapical spot on forewing, the hindwing with some white striæ near inner edge of the dark area and on apical area and an irregular white patch striated with brown at middle of termen.

Habitat.—Madras, Nilgiris (Andrewes). *Exp.* 42 mill. Type in B. M.

3326*b*. Garæus flavipicta, n. sp.

♂. Head and thorax fiery red; antennæ with the shaft whitish, the

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

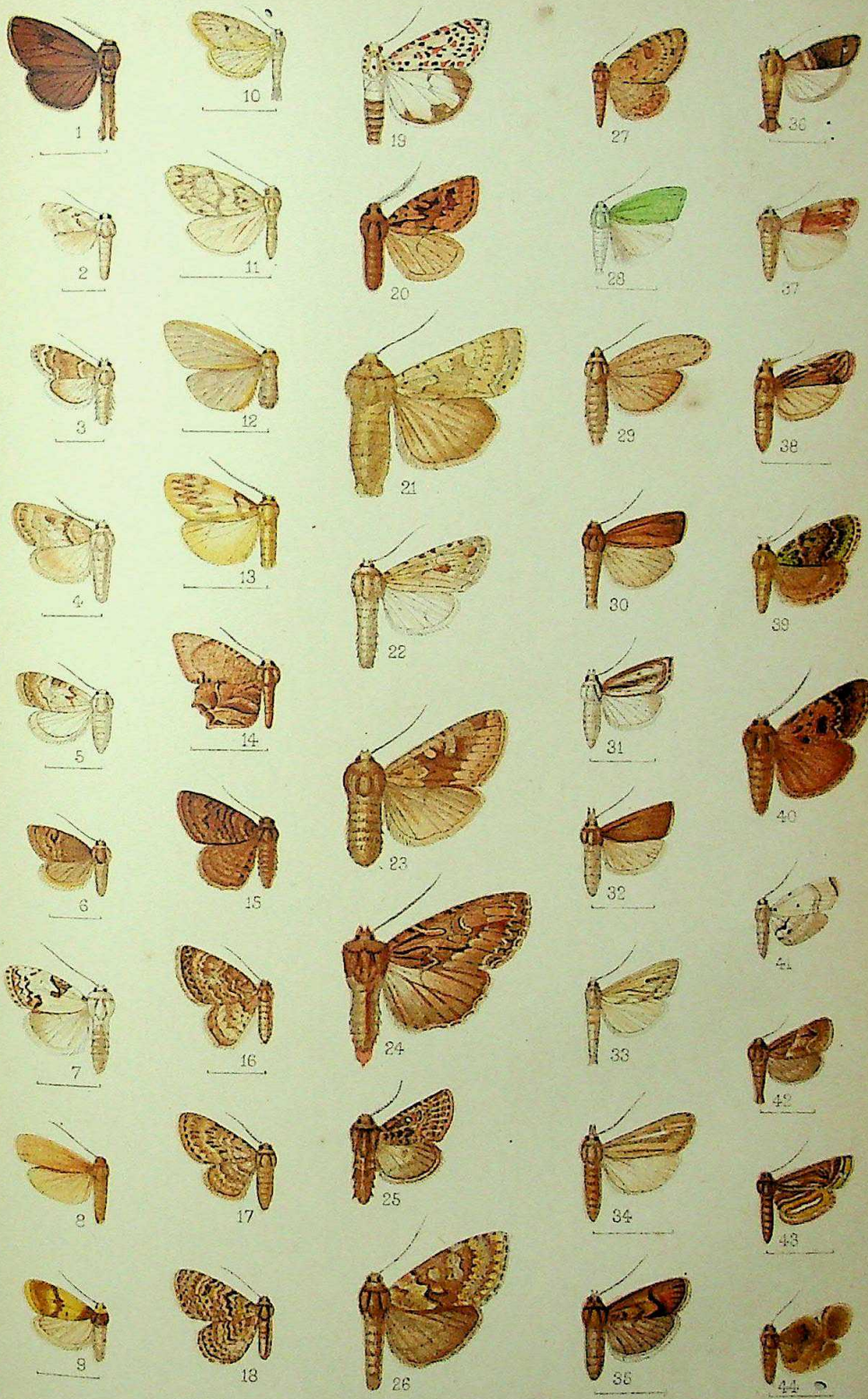
Digitized by Arya Samaj Foundation Chennai and eGangotri

Explanation of Plate G.

1. Arbela theivora.
2. Celama leucoscopula.
3. „ mesotherma.
4. „ rufimixta.
5. „ dentilinea.
6. Rœselia pallidiceps.
7. Zia ectrocta.
8. Ilema atrifrons.
9. Halone flavinigra.
10. Asura phantasma.
11. „ toxodes.
12. „ fulvimarginata.
13. Neasura taprobana.
14. Epiplema fulvihamata.
15. Cidaria nyctichroa.
16. Gymnoscelis lobata.
17. Chloroclystis dentatissima.
18. „ polygraphata.
19. Utetheisa pulchelloides.
20. Episilia clavata.
21. „ arenacea.
22. Lycophotia poliades.
23. Ufeus carnea.
24. Anytus leucocyma.
25. Tichestra serrata.
26. Dichonia chlorata.
27. Chloroclystis plicata.
28. Prasinoxena metaleuca.
29. Melissoblaptes monochroa.
30. Crambus endopolia.
31. „ neurigrammalis.
32. „ albiceps.
33. Chilo arœalis.
34. Prorophora dialeuca.
35. Heterographis augentescens.
36. Nephopteryx rhodobasalis.
37. Thermopteryx rubrifusa.
38. Spatulipalpia albistrialis.
39. Lepidogma chlorophilalis.
40. Macalla eumictalis.
41. Trichophysetis umbrifusalis.
42. Bostra mesaleucalis.
43. Oligostigma andreusialis.
44. Massepha rufescens.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri



Horace Knight del. et lith. West, Newman chromo.

INDIAN MOTHS.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

branches brownish, abdomen yellow tinged with red and brown. Forewing fiery red with a few dark striæ, the medial area with diffused yellow patches on costal area and below the cell and an oblique yellow bar from costa before the angle of postmedial line, the costal edge yellowish on basal area; a diffused brownish antemedial line oblique from costa to median nervure, then slightly waved; a black discoidal point; postmedial line dark slightly defined by violaceous on outer side, acutely angled outwards below costa, then oblique; the apex brownish with some violaceous irroration. Hindwing fiery red sparsely striated with black, the terminal area with a faint violaceous gloss; medial area yellow, narrowing towards costa and with slight red marks on its outer edge towards inner margin, bounded by the dark postmedial line which is excurved and minutely waved from vein 4 to inner margin. Underside of both wings yellow striated with black and with diffused patches of rufous suffusion especially on tornal area of forewing and apical area of hindwing which has the postmedial line excurved between veins 4 and 2.

Habitat.—N. Assam, Dibrugrah (Ward). *Exp.* 38 mill. Type in B. M.

3528*a*. Abraxas diversicolor.

Larva.—Dull fuscous; a pale yellow dorsal stripe interrupted at the junction of the somites; spiracular line red with a series of minute red specks above it; head prominent, glabrous, red; legs and preanal claspers red, anal segment and anal claspers whitish. Food plant *Rhododendron*. (W. H. Campbell).

Larentianæ.

3643*a*. Cidaria nyctichroa, n. sp. (Pl. G., f. 15.)

♂. Head, thorax and abdomen reddish brown mixed with some grey and black, the tegulæ, prothorax and abdomen with blackish bands, the metathorax with black crest; pectus, legs and ventral surface of abdomen brownish white, the fore tibiæ and tarsi black with pale rings. Forewing reddish brown suffused with a black and with numerous minutely waved black lines, the double antemedial line and the postmedial line rather more prominent, the latter excurved below costa and at middle; a waved greyish subterminal line and black terminal line. Hindwing red-brown suffused with black and with numerous waved black lines except on costal area which is greyish; a black terminal line; the underside whitish irrorated with fuscous, curved sinuous medial and postmedial blackish lines and a broad diffused subterminal band.

Habitat.—Madras, Palnis (Campbell). *Exp.* 28 mill. Type in B. M.

3738. Photoscotosia venipicta insert (syn.) *Eustroma pilosa*, Th. Mieg. Le Nat. 1910, p. 34.

3747*b*. Pomasia punctaria, n. sp.

♀. Head white with blackish bars above from and between antennæ,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

the back of head and tegulæ yellow, the latter with blackish patches; palpi blackish banded with white; antennæ brown, the basal joint white in front; thorax brown with white patches on patagia; pectus and legs yellow, the fore and mid tibiæ and tarsi banded with brown; abdomen dark-brown with dorsal series of white spots and segmental lines, the extremity and ventral surface orange-yellow. Forewing brown with numerous waved white lines with series of small spots between them, the apical area and termen with the markings orange-yellow; a white discoidal annulus with white point in centre; the termen with a series of orange lunules concave towards base. Hindwing brown with numerous waved white lines with series of small spots between them, the terminal area with the markings orange-yellow.

Habitat.—Madras, Nilgiris (Andrewes). *Exp.* 24 mill. Type in B. M.

3754. Gymnoscelis subtrigosa, insert *Eupithecia substristigera*, Wk., XXXV., 1879, (1866); which has precedence.

Larva.—Black; two yellow-green dorsal lines conjoined at the junctions of the somites by bands of the same colour; a spiracular series of yellow-green spots and a few similar spots on the ventral surface; head black, glabrous. Feeds gregariously on a species of low-growing Fig. (W. H. Campbell.)

3755*a*. Gymnoscelis lobata, n. sp. (Pl. G., f. 16.)

Hind tibia with long inner medial spur, the outer spur absent: hindwing of male with costal lobe folded over on underside, the inner area folded over on underside and grooved.

♂. Head, thorax and abdomen ochreous mixed with reddish brown, the underside ochreous whitish, the fore tibiæ and tarsi fuscous ringed with white. Forewing greyish ochreous irrorated with fuscous; subbasal line represented by slight double dark striæ from costa; antemedial line slight, waved, inwardly oblique, a waved dark band beyond it with the black discoidal striga on its outer edges; a faint double minutely waved medial line; postmedial line double, minutely waved and obliquely curved, with fuscous suffusion on its inner side; subterminal line pale, minutely waved, with fuscous suffusion on its inner side, the area beyond it purple; a fine dark terminal line; cilia ochreous and fuscous. Hindwing greyish ochreous irrorated with fuscous; traces of double waved ante and postmedial lines; a rather punctiform blackish subterminal line, the area beyond it tinged with purple; a fine black terminal line; cilia ochreous and fuscous. Underside of forewing suffused with purple except the inner area to beyond middle, a curved whitish postmedial band with deeper purple before and beyond it; hindwing whitish, the costal fold fulvous, an obliquely curved purple postmedial band from costa to vein 4 and a terminal band.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

♀. Head and abdomen more fulvous; wings tinged with green; forewing with the suffusion before postmedial and subterminal lines rufous, no purple on termen; the underside with the purple replaced by brown.

Habitat.—CEYLON, Madulsima (Vaughan), Maskeliya (Alston), Ambawela (Green), Hakgala (Green). *Exp.* ♂ 18, ♀ 20 mill. Type in B. M.

3770*b*. CHLOROCLYSTIS DENTATISSIMA, Warr., Nov. Zool., v., p. 428 (1898). (Pl. G., f. 17.)

♀. Head, thorax and abdomen grey tinged with reddish brown; palpi fuscous towards tips; fore tarsi brown ringed with whitish. Forewing grey suffused and irrorated with brown; subbasal line represented by a black striga from costa, the antemedial line by black striæ from costa and inner margin and at median nervure, inwardly oblique; a blackish point on middle of costa; postmedial line faint, waved, with short black streaks on the veins, oblique from costa to vein 6, angled inwards at discal fold and oblique below vein 4; subterminal line whitish, minutely dentate, defined on inner side by slight dark streaks on the veins; a terminal series of black striæ with minute streaks before them in the inter spaces. Hindwing grey suffused and irrorated with brown; indistinct minutely waved, subbasal antemedial and medial lines; postmedial line blackish, curved, slightly incurved at discal fold, with another faint line beyond it; subterminal line whitish defined on inner side by brown, minutely dentate; a terminal series of black striæ; the underside brownish white with curved dark medial and postmedial lines except on inner area, a fine black terminal line.

Habitat.—CEYLON, Peradeniya (Green), Colombo (Mackwood); Cocos KEELING I; KEY IS; N. AUSTRALIA, Port Darwin. *Exp.* 18-22 mill.

3770*c*. CHLOROCLYSTIS POLYGRAPHATA, n. sp. (Pl. G., f. 18.)

♀ Head, thorax and abdomen grey mixed with fuscous and tinged in parts with rufous; palpi, sides of frons, pectus and legs blackish, the tarsi slightly ringed with white. Forewing grey, slightly tinged with reddish brown and irrorated with fuscous; subbasal line double, curved, from costa to submedian fold, the inner line indistinct, antemedial area with two indistinct waved lines, the antemedial line black, diffused and oblique to median nervure, then minutely waved, the medial area with two lines, oblique to just below cell, then minutely waved; a strong black postmedial lunule with blackish patches above it on costa and black points below it on veins 3 and 2; postmedial line fine, on a pale band slightly angled outward at vein 6, oblique to below vein 4, then minutely waved, a diffused lunulate dark line beyond it; subterminal line whitish defined on each side by fuscous, minutely waved; cilia fuscous intersected with whitish. Hindwing grey tinged with brown; a black mark on base of median nervure and two spots an inner margin; two obscure antemedial lines angled outwards at middle and interrupted in submedian inter space; postmedial line double,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

the inner line with slight dentate black marks before it on median nervules, angled outwards at middle, then incurved and minutely waved ; subterminal line double, maculate, oblique from costa to vein 3 where it is obtusely angled ; a series of fuscous spots just before termen from apex to vein 3 ; cilia tinged with ochreous and with series of fuscous spots at base. Underside of both wings suffused with fuscous brown ; hindwing with obscure maculate postmedial line excurved at middle.

Habitat.—Ceylon, Hakgala (Green). *Exp.* 28 mill. Type in B. M.

3773*b*. Cloroclystis plicata, n. sp. (Pl. G., f. 27.)

Forewing of male with the costa folded over on upperside from before middle to towards apex.

Head, thorax and abdomen grey suffused with reddish brown, palpi blackish except at base, the tips of 3rd joint white. Forewing grey suffused with red-brown and with some black irroration on the veins; antemedial line indistinct, double, waved ; three oblique blackish striæ from medial part of costa ; postmedial line indistinct, double, minutely waved, excurved to vein 4, then oblique ; subterminal line grey, minutely waved, with slight black streaks before it below costa and at middle and beyond it in the inter spaces ; a terminal black line. Hindwing grey suffused with red-brown, the median nervure and veins beyond lower angle of cell irrorated with black to the indistinct double whitish postmedial line which is excurved at middle ; an indistinct dentate whitish subterminal line ; a black terminal line.

Habitat.—Ceylon, Hakgala (Green), Ohiya (Green), Newara Eliya (Mackwood), Horton Plains. *Exp.* 26 mill.

Acidalianæ.

3925. Ephyra validaria, insert (syn.) 4076*a*. *Geometra rufifrontaria*.

3971*a*. Timandra flavisponsaria, n. sp.

Head rufous ; antennæ whitish towards base and with white bar between their bases ; thorax yellow tinged with rufous ; legs rufous ; abdomen yellow tinged with rufous. Forewing ochreous yellow, the costal and terminal areas suffused with rufous and irrorated with blackish ; antemedial rufous points on median nervure and vein 1 ; a minute rufous discoidal spot ; traces of an oblique postmedial line defining the rufous terminal area, obsolete towards costa and excurved between vein 5 and submedian fold ; subterminal line with diffused oblique blackish streak from apex, then represented by a series of black points ; a fine red-brown terminal line ; cilia rufous. Hindwing ochreous yellow slightly striated with brown, the terminal half suffused with rufous ; an oblique red-brown medial line with rufous band beyond it and fuscous patch on costal area ; a brown postmedial line excurved between veins 4 and 2 ; a fine red-brown terminal line ; cilia rufous. Underside of both wings tinged with rufous

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

and prominently striated with blackish, the postmedial line black, excurved between veins 5 and 2, a black terminal line ; forewing with black discoidal spot.

Habitat.—Madras, Wynâd (Cardew), Nilgiris (Andrewes) ; Burma, Katha (Bingham). *Exp.* 30 mill.

PYRALIDÆ.

Gallerianæ.

4141*c*. Prasinoxena metaleuca, n. sp. (Pl. G., f. 28).

♂. Head, thorax and abdomen white, the patagia green. Forewing apple-green with two brownish grey discoidal points and one in discal fold beyond the cell ; the costal edge brown towards apex ; cilia white with waved brown line at base and fuscous tips. Hindwing white. Underside of forewing with the fringe of hairy scales on and beyond median nervure ochreous white.

Habitat.— Ceylon, Kandy (Mackwood). *Exp.* 16 mill. Type in B. M.

4144*c*. Melissoblaptes monochroa, n. sp. (Pl. G., f. 29).

♂. Head, thorax and abdomen brownish white. Forewing pale brownish ochreous, sparsely irrorated with black ; a subbasal black point in cell ; a series of black points on costa towards apex and on termen from apex to vein 2. Hindwing uniform pale brownish ochreous.

Habitat.—Ceylon, Ambalangoda (Pole). *Exp.* 32 mill. Type in B. M.

Crambinæ.

4156*b*. Crambus endopolia, n. sp. (Pl. G., f. 30).

♂. Head and thorax pale grey-brown ; pectus, legs and abdomen whitish tinged with brown. Forewing pale grey-brown, the inner area paler to submedian fold, the veins beyond the cell slightly streaked with whitish and defined above and below by faint brown streaks ; traces of a brown point at middle of vein 1 and discoidal point ; an indistinct highly curved postmedial brown line. Hindwing white tinged with brown ; the underside with the inner area whiter.

Habitat.—Ceylon, Wellawaya (Green). *Exp.* 26 mill. Type in B. M.

4169*a*. Crambus neurigrammalis, n. sp. (Pl. G., f. 31).

Head and thorax white, sides of palpi, antennæ and patagia golden bronze ; abdomen white faintly tinged with ochreous. Forewing white ; a diffused golden bronze fascia on costal area to subterminal line and another on median nervure to well beyond angle of cell ; a black discoidal spot ; the veins beyond the cell defined by fine golden bronze streaks ; a double highly curved subterminal line with small wedge shaped black-brown mark beyond it on costa ; a black-brown terminal line. Hindwing white with a slight bronze terminal line from below apex to submedian fold.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Habitat.—Ceylon, Ambalangoda (Pole). *Exp.* ♂ 16, ♀ 18 mill. Type in B. M.

4178*b*. Crambus albiceps, n. sp. (Pl. G., f. 32).

♀. Head and thorax grey tinged with brown, the vertex of head whitish; abdomen white tinged with brown. Forewing grey tinged with reddish brown and thickly irrorated with brown; a slight blackish discoidal point and blackish terminal line; cilia with a silvery gloss. Hindwing white tinged with brown, the cilia white; the underside white faintly tinged with brown.

Habitat.—Ceylon, Haputale (Alston). *Exp.* 18 mill. Type in B. M.

4202*c*. Chilo arælis, n. sp. (Pl. G., f. 33).

Forewing with vein 8, 9, 10 stalked, 11 anastomosing with 12.

♂. Head, thorax and abdomen pale ochreous yellow; forelegs brownish, the tibia and tarsus whitish in front. Forewing pale ochreous yellow slightly irrorated with brown and the veins defined by faint brown streaks; traces of an oblique antemedial brown line from vein 2 near base to vein 1; a triangular blackish discoidal spot with a brownish streak from it to termen; postmedial line rather oblique and formed of faint dark streaks from costa to vein 6, then very oblique to middle of inner margin and minutely dentate; two black points on termen above tornus. Hindwing white; the underside with the costal area tinged with ochreous.

Habitat.—Madras, Palnis (Campbell). *Exp.* 26 mill. Type in B. M.

4203. Chilo simplex.

Larva.—Pinkish grey sparsely covered with fine hairs; two faint pale brown dorsal stripes; a diffused lateral band of the same colour; a supra-spiracular series of small black specks; in some cases the whole body is suffused with brown; head red, glabrous; thoracic plate horny. Feeds in the heads and stems of the great millet and *Holcus spicatus*, boring down into the head as the ear is formed and settling in the stem in which it pupates; the whole upper part of the plant rots; very destructive. (W. H. Campbell).

4205. Chilo suppressalis, insert (syn). *Chilo auricilia* Dudgeon. J. Bomb. Soc. xvi., p. 405 (1905).

Food plant Sugarcane.

Anerastianæ.

4279*a*. Ambala albivenalis, n. sp.

Maxillary palpi flattened against frons; antennæ of male strongly laminate and with ridge of scales in sinus at base of shaft; hindwing with veins 3 and 5 stalked to near termen.

Head and thorax white mixed with rufous; abdomen white dorsally suffused with fulvous yellow at base. Forewing ochreous tinged with rufous and slightly irrorated with black, the veins prominently streaked with white; an antemedial black point on vein 1; a postmedial black point

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

on vein 1 and usually an oblique striga between veins 5 and 2; a terminal series of slight black points. Hindwing white with a faint ochreous brown tinge; the cilia pure white.

Habitat.—CEYLON, Puttalam. (Pole) 1 ♂, 1 ♀, Haputale (Alston) 1 ♂, Kegalle (Alston) 1 ♂. *Exp.* 12-20 mill.

4285*a*. ANERASTIA CASTANEALIS, n. sp.

♀. Head, thorax and abdomen chestnut-red; pectus, legs and ventral surface of abdomen paler, the tarsi fuscous ringed with white. Forewing pale chestnut-red, deeper red towards costa; the ante-and postmedial lines represented by traces of short deep red streaks. Hindwing white, the costa and termen slightly tinged with brown; the underside with the costal area tinged with brown.

Habitat.—CEYLON, Kegalle (Alston). *Exp.* 16 mill. Type in B. M.

4299*a*. SALURIA HEMIPHÆALIS, n. sp.

Head and thorax fuscous, the metathorax rufous; abdomen grey dorsally tinged with rufous. Forewing with the costal half fuscous, the inner half rufous, the costal area with a white fascia tapering to a point just before apex. Hindwing semihyaline whitish tinged with brown; cilia whitish with a brown line through them.

Habitat.—CEYLON, Haldamulla (Mackwood), Haputale (Alston). *Exp.* 22·26 mill. Type in B. M.

4304*b*. CRITONIA OCHRACEALIS, n. sp.

Palpi of male oblique, the 2nd joint hollowed out to receive the brush like maxillary palpi; antennæ serrate, with large tuft at base of shaft. Head and thorax brownish ochreous; abdomen ochreous. Forewing ochreous with a brownish tinge below costal area from base to apex; the costal edge blackish at base; a blackish antemedial point on vein 1; an ill-defined blackish discoidal spot; an oblique postmedial series of blackish points on the veins; an oblique blackish bar from apex and terminal series of black points. Hindwing semihyaline ochreous, the costal area tinged with brown towards apex; a fine dark terminal line. Underside of forewing suffused with fuscous brown, except on inner and terminal areas, more extensively suffused in female.

Habitat.—PUNJAB; Kangra Valley (Dudgeon); MADRAS, Nilgiris (Andrewes). *Exp.* ♂ 26, ♀ 30 mill. Type in B. M.

4312. POLYACHA DEPRESSELLA insert (syn). *Polyocha saccharella* (Dudgeon) J. Bomb. Soc. xvi, p. 405 (1905).

This belongs to Sect. II; but the forewing has veins 4·5 approximated for some distance and veins 10 from the cell, hindwing with veins 3 from angle of cell and 8 free.

Larva on sugarcane.

4326*a*.—HETEROGRAPHIS ARGENTESCENS, n. sp. (Pl. G., f. 35).

♀. Head and thorax rufous with some silvery scales; antennæ blackish

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

abdomen ochreous brown. Forewing ochreous mostly suffused with bright rufous; traces of an oblique dark antemedial line with silvery scales before it towards inner margin; an oblique medial band of silvery suffusion; an indistinct oblique dark postmedial line with band of silvery suffusion beyond it; the inner margin blackish from near base to a dark brownish batch at tornus; cilia silvery whitish at tips. Hindwing ochreous brown, the cilia silvery white except at base.

Habitat.—Ceylon, Kegalle (Alston). *Exp.* 20 mill. Type in B. M.

Phycitinæ.

Genus Prorophora.

Type.

Prorophora, Rag., Ann. Soc. Ent. Fr. 1887, p. 252 ..... *curvibasella.*

Proboscis well developed; palpi down-curved, typically extending about the length of head; maxillary palpi slightly tufted with hair; frons with pointed prominence hidden in a tuft of hair; antennæ of male almost simple. Forewing long and narrow, the apex rounded; vein 3 from angle of cell; 4·5 on a long stalk from above angle; 8·9 stalked; 10·11 from cell. Hindwing with vein 3 from angle of cell; 4·5 on a long stalk; 6·7 from upper angle; 8 not anastomosing with 7.

4335*b*. Prorophora dialeuca, n. sp. (Pl. G., f. 34).

Palpi extending twice the length of head.

♀. Head, thorax and abdomen grey suffused with brown. Forewing grey suffused with brown and slightly irrorated with fuscous; a white streak above median nervure from before middle of cell to termen at discal fold, emitting minute spurs on bases of veins 4·3; slight fuscous medial marks on median nervure and vein 1, and a postmedial series of minute diffused streaks on the veins, oblique below vein 4; the veins slightly streaked with whitish towards termen which is more strongly irrorated with brown. Hindwing semihyaline white, the termen faintly tinged with ochreous brown.

Habitat.—Ceylon, Elephant Pass (Mackwood), Jaffna (Mackwood). *Exp.* 24 mill. Type in B. M.

Genus Hyphantidium.

Type.

Hyphantidium, Scott., Proc. Zool. Soc., 1859, p. 207 .. *sericaria.*

Assara, Wlk., xxvii, 79 (1863) .. .. *albicostalis.*

Cateremna, Meyr., Pr. Linn. Soc., N. S. W., vii, p. 156 (1882) .. .. *microdoxa.*

Seneca, Hulst., Trans. Am. Ent. Soc., xvii, p. 177 (1890).. *tumidella.*

4345. Hyphantidium albicostalis, Wlk., xxvii, 80 (1869); Rag. Rom. Mém., viii, p. 73, pl. xxv., f. 14.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Euzophera subterebrella, Snell., Tijd. V. Ent., xxiii, p. 250 (1880); id., xxvii, p. 54, pl. v., f. 12.

„ *nivricostella*, Hmpsn., Moths. Ind., iv., p. 74 (1896).

4354*a*. NEPHOPTERYX NEPHELOALIS, n. sp.

♀. Head, throax and abdomen grey suffused with brown; pectus and ventral surface of abdomen whitish; tarsi blackish ringed with white. Forewing grey suffused with brown; some diffused whitish from base of costa followed by a dark shade; an oblique whitish diffused antemedial band with the slight double brown antemedial line on its outer edge followed by a blackish shade from costa to median nervure; two obliquely placed blackish discoidal spots; subterminal line whitish defined on each side by dark lines and with slight oblique dark shade from its inner side at costa, slightly excurved at middle and very minutely waved; a terminal series of blackish points. Hindwing pale suffused with brown; cilia whitish with a brown line near base.

Habitat.—CEYLON, Trincomali (Green). *Exp.* 20 mill. Type in B. M.

4359*d*. NEPHOPTERYX RHODOBASALIS, n. sp. (Pl. G., f. 36.)

Antennæ of male with large tuft of scales from basal joint and sinus at base of shaft but without tuft of scales in it; the tibiæ broadly scaled; large black anal and genital tufts with some silvery scales in them.

Head and thorax ochreous tinged with rufous; tibiæ and tarsi banded with blackish; abdomen fuscous, ochreous at base. Forewing with the basal area whitish tinged with pink and rufous and with dark patches on costa at base and before middle; antemedial line double, oblique, formed of raised blackish and silvery scales; the rest of wing fuscous mixed with greyish; two obscure discoidal spots with some whitish before and beyond the lower; subterminal line indistinct, double filled in with whitish, the inner line minutely dentate, slightly incurved below costa; a terminal series of black points; cilia with a fine whitish line at base followed by a dark line. Hindwing semihyaline whitish, the veins and a terminal line brown; cilia with a dark line near base.

Habitat.—CEYLON, Madulsima (Vaughan). *Exp.* 18 mill. Type in B. M.

4359*e*. NEPHOPTERYX ACROBASELLA, n. sp.

Maxillary palpi of male dilated with scales and flattened against the frons; antennæ with sinus at base containing a tuft of scales; thorax with tufts of long hair from below base of hindwing.

Head and thorax grey mixed with some red and pale olive brown, the tarsi fuscous ringed with white; abdomen brownish ochreous with grey and fuscous bands. Forewing grey irrorated with purplish red; some olive ochreous on basal inner area; the first line medial, blackish, oblique, straight, with a conical olive ochreous band before it, not quite reaching costa, and defined on inner side by band of raised blackish, red and silvery

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

scales from cell to inner margin; two black discoidal points; an olive ochreous postmedial band from submedian fold to inner margin; subterminal line whitish defined on inner side by black and on outer by red, almost straight, oblique; a fine black terminal line; cilia whitish with an ochreous line at base followed by a fine dark line. Hindwing semihyaline whitish tinged with brown; a blackish terminal line; cilia with a dark line near base.

Habitat.—CEYLON, Hambantota (Bainbrigge-Fletcher). *Exp.* 18 mill. Type in B. M.

4370*d*. NEPHOPTERYX FERREOTINCTA, n. sp.

♀. Head, thorax and abdomen grey-brown mixed with whitish; tarsi fuscous ringed with white; abdomen with brownish dorsal bands towards base, the anal tuft ochreous, the ventral surface white. Forewing white, thickly irrorated and suffused with grey-brown and with some rufous especially on inner area before and beyond the subterminal line; antemedial line ill-defined, whitish, with diffused black patch before it on inner half and diffused white patch beyond it, oblique from costa to submedian fold, then incurved: two indistinct conjoined brown discoidal points; subterminal line white, slightly angled inwards at discal and submedian folds; a terminal series of blackish points; cilia with a white line near base. Hindwing semihyaline whitish, the costal area tinged with brown; a fine brown terminal line and line near base of cilia.

Habitat.—CEYLON, Matale (Pole). *Exp.* 20 mill. Type in B. M.

Genus THERMOPTERYX, nov.

Type.—*T. rubrifusa*.

Palpi upturned, the second joint reaching about to vertex of head and moderately fringed with scales in front, the third short; maxillary palpi slightly dilated with scales; frons smooth; antennæ of female almost simple; tibiæ slightly fringed with hair. Forewing with veins 2-3 on a long stalk; 4-5 closely approximated for about half their length and not in line with median nervure; 6 from upper angle; 8-9 stalked and 10 closely approximated to them for about half its length. Hindwing with vein 3 from angle of cell; 4-5 strongly stalked; 6-7 from upper angle; 8 not anastomosing with 7; the cell about half length of wing.

4382*a*. THERMOPTERYX RUBRIFUSA, n. sp. (Pl. G., f. 37.)

♀. Head, thorax and abdomen grey-white suffused in parts with rufous; palpi fuscous. Forewing grey-white irrorated with rufous; a patch of rufous suffusion on basal costal area; the inner area suffused with rufous from before middle where it extends almost to costa and thence obliquely to termen between veins 3 and 2; a patch of rufous suffusion at apex; two rufous discoidal points; a greyish subterminal line, slightly bent outwards at discal fold, then minutely waved; a terminal series of

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

rufous points. Hindwing semihyaline white, the costal area faintly tinged with rufous towards apex.

Habitat.—Ceylon, Trincomali (Green). *Exp.* 28 mill. Type in B. M.

4383*c*. Myelois atrimaculalis, n. sp.

♀. Head, thorax and abdomen grey mixed with red-brown, the pectus, legs and ventral surface of abdomen greyer. Forewing grey suffused with red brown; a small subbasal black spot below costa; small antemedial black spots just below costa and on vein 1; a rather large blackish spot at lower angle of cell with two black points above it: a minutely dentate postmedial dark line from below costa to submedian fold, the veins beyond it with slight dark streaks ending in minute terminal black points. Hindwing greyish tinged with brown especially on apical area.

Habitat.—Ceylon, N. C. Province (Pole). *Exp.* 18 mill. Type in B. M.

4385*a*. Phycita umbratalis, n. sp.

♂. Head and thorax grey-brown mixed with some fuscous; abdomen grey-brown; the tarsi with slight pale rings. Forewing grey suffused with fuscous-brown; antemedial line diffused, brown, curved, with black points before it on median and submedian nervures; a black discoidal point; the veins of postmedial area with short black streaks; subterminal line grey defined on inner side by black and on outer by red-brown; a terminal series of black points; cilia grey with brown lines at base and middle. Hindwing greyish white with fine brown lines on termen and near base of cilia.

Habitat.—Madras, Horsleykonda (Campbell). *Exp.* 18 mill. Type in B.M.

4389*c*. Phycita melanosticta, n. sp.

♀. Head, thorax and abdomen grey suffused with brown; tarsi fuscous ringed with white; ventral surface of abdomen white. Forewing grey suffused with brown and clouded in parts with fuscous; the first line medial, double, brown filled in with white and defined on outer side by white, slightly excurved below costa and with short black streak before it above vein 1; a slight curved black striga on upper discocellular and a blackish shade beyond the cell bent inwards below vein 4; postmedial line white, rather oblique from costa to vein 4 and slightly angled inwards in submedian fold; a terminal series of dark points. cilia whitish with a fine brown line near base. Hindwing semihyaline white. the costal area tinged with brown towards apex; a fine brown terminal line and line through the cilia.

Habitat.—Ceylon, Peradenya (Green), Habarana (Green). *Exp.* 22-24 mill. Type in B.M.

4393*a*. Phycita mimella, Rag., Bull. Soc. Ent. Fr. 1889, p. ccxviii; id. Rom. Mém. vii, p. 163, pl. viii, f. 3.

♀. Head, thorax and abdomen grey mixed with brown, the tarsi with pale rings. Forewing grey tinged in parts with brown and rather thickly

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

irrorated with black; antemedial line indistinctly double, oblique from costa to submedian fold and incurved at vein 1, a brownish patch before it in and below the cell, defined on inner side by a black bar; two small black discoidal spots; postmedial line indistinct, brown defined on outer side by whitish, arising below costa, oblique to vein 6, then minutely waved and somewhat bent outwards to inner margin, an oblique blackish shade beyond it from costa; a terminal series of black points; cilia white tinged with brown. Hindwing semihyaline white, the veins and costa towards apex tinged with brown; a fine brown terminal line from apex to vein 1; cilia with a fine brown line near base from apex to vein 1.

Habitat.—Ceylon, Kegalle (Alston); New Guinea, Port Moresly. *Exp.* 18 mill.

4421*b*. Spatulipalpia albistrialis, n. sp. (Pl. G., f. 38.)

Palpi of male with the second joint strongly dilated with a fold enclosing the brush-like maxillary palpi and fringed with hair on outer side at extremity; frons hollowed out; antennæ with the basal joint large, the shaft with sinus at base enclosing a large tuft of scales, then laminate; the vertex of head with ridge of scales; forewing with veins 8, 9, 10 stalked; hindwing with the lower angle of cell very strongly produced to half the length of wing, the median nervure and discocellulars closely approximated, veins 3, 4, 5 from angle, 4, 5 closely approximated for about one-third length.

♂. Head, thorax and abdomen bright rufous, the second joint of palpi in front, the basal joint of antennæ and tuft of scales in sinus, and the tegulæ at middle ochreous; tibiæ and tarsi banded with dark brown. Forewing bright rufous with fine blackish streaks on the veins; a silvery whitish streak below base of cell; antemedial line silvery whitish, strongly angled outwards in cell, then running inwards as a streak above median nervure to near base and on inner area represented by an oblique streak to inner margin with a streak from it above vein 1 to postmedial line; a silvery whitish streak in lower extremity of cell and short streaks in the interspaces beyond the cell; a blackish discoidal spot; postmedial line silvery whitish, arising from costa near apex, acutely angled inwards in discal fold and outwards at vein 5, then oblique to just above vein 1 to which it is slightly bent outwards; a fine black terminal line; cilia whitish at base and tips with fine red lines through them, brown at middle. Hindwing whitish tinged with brown; cilia with whitish line at base followed by a brown line.

Habitat.—Ceylon, Maskeliya (Alston), 1 ♂. type. *Exp.* 20 mill.

4421*c*. Spatulipalpia albicostalis, n. sp.

♂. Head and tegulæ white slightly tinged with brown; thorax and abdomen pale brown, the anal tuft, pectus, legs and ventral surface of abdomen white tinged with ochreous. Forewing pale ochreous brown, the

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

costal area white slightly irrorated with brown; obliquely placed antemedial dark points on and below costa; a slight white discoidal striga; a straight punctiform postmedial dark line slightly defined on outer side by whitish, and punctiform terminal line; a fine whitish line at base of cilia. Hindwing pale tinged with brown; a fine brown line near base of cilia.

Habitat.—Ceylon, Poyahawelle (Alston). *Exp.* 16 mill. Type in B. M.

4425*a*. Cryptoblabes scotochroalis, n. sp.

♀. Head and thorax dark cupreous brown with a greyish glose; abdomen greyish suffused with brown; pectus, legs and ventral surface of abdomen whitish mixed with fuscous, the fore legs fuscous, the tarsi fuscous with slight pale rings. Forewing dark cupreous brown with a silvery grey glose; antemedial line rather strong, white, oblique from below costa to inner margin towards which it is diffused on inner side; subterminal line slight, whitish, somewhat excurved at middle then oblique; a faint greyish terminal band; cilia greyish. Hindwing greyish tinged with brown especially on the veins; cilia pale brownish with a white line at base.

Habitat.—Ceylon, Kegalle (Alston). *Exp.* 14 mill. Type in B. M.

4427*a*. Cryptoblabes flavizonalis, n. sp.

♀. Head and thorax brownish white; palpi black at side; a black-brown band between antennæ; abdomen yellowish with lateral fuscous marks and dorsal black points on basal segments; the terminal segments fuscous with whitish bands; pectus, legs and ventral surface of abdomen white mixed with some fuscous, the tarsi fuscous ringed with white. Forewing white slightly irrorated with black, the inner area suffused with purple-red; obliquely placed subbasal black points below costa and cell; an antemedial olive-yellow band expanding on inner half and defined on each side by black lines overlaid by silvery scales; two black discoidal points; subterminal line white defined on inner side by a red line blackish and angled outwards below costa and on outer by a rather diffused black line overlaid by silvery scales with some red on its outer edge; a terminal series of black points; cilia whitish with brownish lines near base and tips. Hindwing white tinged with brown especially on the veins; the cilia whitish with a faint brownish line near base.

Habitat.—Ceylon, Kegalle (Alston). *Exp.* 12 mill. Type in B. M.

Epipaschianæ.

4538*a*. Lepidogma chlorophilalis, n. sp. (Pl. G., f. 39.)

♀. Head and thorax green mixed with rufous and a few black scales; palpi black at tips; antennæ blackish except at base; tibiæ and tarsi banded with black; abdomen ochreous tinged with brown and with obscure blackish bands except at base. Forewing sap-green irrorated with black; the terminal half of costa red, the medial area sometimes irrorated with red; subbasal line represented by black points below costa and cell; some

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

black below the cell and on inner margin before the rather diffused oblique waved antemedial line; a discoidal tuft of black scales; postmedial line black defined on outer side by whitish, dentate, excurved from below costa to vein 2; subterminal line represented by a pale green band defined on inner side by dark green or blackish suffusion and on outer by a terminal series of dark green lunules; cilia chequered white and black. Hindwing pale almost wholly suffused with fuscous; a curved minutely waved diffused dark postmedial line defined on outer side by whitish; the termen purplish red with a terminal series of small black lunules; cilia whitish chequered with black from apex to vein 2; the underside whitish suffused with purplish brown, especially on terminal area, a curved dentate dark postmedial line.

Habitat.—Ceylon, Maskeliya, (Pole), Madulsima (Vaughan). *Exp.* 30 mill. Type in B. M.

4438*b*. Lepidogma melanolopha, n. sp.

♀. Head, thorax and abdomen pale reddish brown; palpi black with pale ring at base and extremity of third joint; tibiæ and tarsi black ringed with white. Forewing pale reddish brown sparsely irrorated with black; the costal area suffused with black to the postmedial line, the subbasal and antemedial lines represented by pale bars on it; a prominent tuft of black scales at upper angle of cell; a faint diffused fuscous shade beyond and below the cell; postmedial line black, strongly excurved below vein 6 and slightly incurved below vein 3; a terminal series of black striæ and a fuscous shade on terminal area above tornus; cilia fuscous with a pale line at base. Hindwing pale reddish brown suffused with fuscous; a subterminal black bar at vein 2 defined on outer side by whitish; a blackish terminal line; cilia fuscous with a pale line at base; the underside ochreous whitish irrorated with fuscous especially on costal area, the terminal area tinged with fuscous, a pale postmedial line obliquely curved to submedian fold near termen.

Habitat.—Ceylon, Kegalle (Mackwood). *Exp.* 20 mill. Type in B. M.

4545*b*. Macalla brachyscopalis, n. sp.

Male with the antennal process short and hardly extending behind the head.

♂. Head and thorax olive-green with some black scales; palpi mostly black; antennal process black at tip; tarsi black with pale rings; abdomen olive green with some black scales, tinged with rufous and largely mixed with black towards extremity. Forewing olive-green, irrorated with black expecially towards costa, the terminal area slightly ringed with rufous; a pale oblique antemedial striga from costa; a discoidal tuft of black scales; postmedial line blackish defined on outer side by pale olive, oblique from costa to vein 5, excurved to vein 2, then again oblique to near tornus; a terminal series of small triangular black spots; cilia chequered olive and

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

blackish, with a fine pale line at base. Hindwing pale silky olive tinged with fuscous especially on terminal area; a terminal series of small triangular black spots; cilia with a fine pale line at base.

Habitat.—CEYLON, Maskeliya (Alston). *Exp.* 22 mill. Type in B. M.

4446*b*. MACALLA EUMICTALIS, n. sp. (Pl. G., f. 40.)

Head, thorax and abdomen greyish mixed with rufous and black; tarsi black with pale rings. Forewing greyish tinged with olive and in parts with rufous especially on medial area and irrorated with black, the apical area suffused with black; some black suffusion on base of inner margin and on costa before middle; antemedial line represented by a ridge of raised black scales, inwardly oblique from costa to vein 1, then bent outwards above inner margin; a sinuous medial ridge of black scales from cell to inner margin; a discoidal tuft of black scales and a diffused oblique ridge of scales from lower angle of cell to vein 1; postmedial line black, dentate, oblique from costa to vein 4, then erect and angled inwards at vein 2, a whitish patch before it beyond the cell; a terminal series of rather triangular blackish spots with a slight whitish patch before them at middle; cilia chequered rufous and blackish. Hindwing olive tinged with rufous and fuscous; cilia with a fine pale line at base.

Habitat.—CEYLON, Maskeliya (de Mowbray). *Exp.* ♂ 34, ♀ 40 mill.

ENDOTRICHINÆ.

4504*a*. TRICHOPHYSETIS UMBRIFUSALIS, n. sp. (Pl. G., f. 41).

♀. Head, thorax and abdomen white, the last faintly tinged with brown; palpi with some black scales; two black points between antennæ; fore tibiæ, the spurs and tarsi with black points. Forewing white with a faint brownish tinge on inner area except towards base and on terminal area; a black point below base of vein 1; an indistinct double curved brownish antimedial line with black points at costa and submedian fold; an indistinct double curved brownish postmedial line; a minutely waved fuscous line from costa towards apex to termen at vein 3, the area beyond it suffused with brown. Hindwing white, the terminal area tinged with brown; a double brown antemedial line with black spot on its outer edge in submedian fold; a double brown postmedial line with black spot on its inner edge at submedian fold almost touching the antemedial spot, and black point at inner margin; cilia brown; the underside with indistinct double subterminal line from costa to vein 3 with black spot on its inner side at costa.

ab. 1. Abdomen more suffused with brown and irrorated with black; forewing with the inner half from before middle suffused with brown and irrorated with black; hindwing with the inner area from before middle and the terminal area suffused with brown and black.

Habitat.—MADRAS, Nilgiris, Ootacamund (Cardew), Ouchterlong Valley (Andrewes). *Exp.* 22 mill. Type in B. M.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

PYRALINÆ.

4546*d*. STEMMATOPHORA ÆDALIS, n. sp.

♀. Head, thorax and abdomen brownish grey irrorated with black; the tarsi with slight pale rings. Forewing grey tinged with brown and thickly irrorated with fuscous; antemedial line white, almost obsolete towards costa, angled outwards on median nervure and oblique towards costa and inner margin; postmedial line whitish, excurved at middle and above inner margin; a fine pale line at base of cilia. Hindwing grey suffused with brown, the inner area slightly tinged with purplish; a slight curved whitish postmedial line; a fine dark terminal line: cilia whitish with dark lines near base and tips; the underside grey tinged with purplish and thickly irrorated with fuscous, a curved white postmedial line defined on inner side by fuscous.

Habitat—MADRAS, Horsleykonda (Campbell). *Exp.* 22 mill.

4610*a*. BOSTRA SARCOSIA, n. sp.

♂. Head and thorax brownish ochreous; palpi blackish at tips; antennæ with the shaft ringed with black towards base; pectus and legs tinged with reddish and with black mixed, the tarsi black with pale rings; abdomen brownish ochreous irrorated with black, the anal tuft with some black, the ventral surface tinged with purplish red towards extremity. Forewing brownish ochreous with a slight flesh-coloured tinge and sparsely irrorated with black; a series of black points on costa; a black discoidal point; postmedial line formed of black scales, excurved to vein 3, then incurved; a terminal series of black striæ; cilia purplish red with black lines near base and tips. Hindwing ochreous irrorated with fuscous; a rather diffused fuscous curved postmedial line; a terminal series of black points: cilia purplish red with black lines near base and tips; the underside with the costal and terminal areas irrorated with black, a black discoidal point.

Habitat—CEYLON, Galgama (Mackwood). *Exp.* 14 mill. Type in B. M.

4611*a*. BOSTRA MESOLEUCALIS, n. sp. (Pl. G., f. 42).

♂. Head and thorax pale olive slightly tinged with rufous and with some blackish scales; legs whitish; abdomen whitish irrorated with black. Forewing pale olive, the medial area white irrorated with black, the terminal area irrorated with black; some diffused purplish red on base of median nervure; an oblique white antemedial line defined on inner side by purplish red suffusion; postmedial line white defined on inner side by diffused purplish red wedge-shaped patches at discal and submedian folds, oblique from the costa to vein 6, excurved to vein 4, then incurved; a blackish terminal line: cilia with a fine white line at base. Hindwing pale olive irrorated with fuscous; a blackish terminal line; cilia with a white line at base.

Habitat.—CEYLON, Maskeliya (Alston). *Exp.* 20 mill. Type in B. M.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

HYDROCAMPINÆ.

4645*c*. NYMPHULA GRISEALIS, n. sp.

♀. Head and thorax grey tinged with brown; palpi with the 2nd joint fuscous at sides; abdomen reddish brown, the ventral surface grey. Forewing glossy brownish grey, the terminal area suffused with fuscous brown, a diffused brownish discoidal spot. Hindwing pale brownish grey: cilia of both wings with pale line at base followed by a darker line.

Habitat.—CEYLON, Peradeniya (Green). *Exp*. 18 mill. Type in B. M.

4671*a*. OLIGOSTIGMA ANDREUSIALIS, n. sp. (Pl. G. f. 43).

♀. Head and thorax whitish mixed with yellow-brown and fuscous scales; antennæ ringed with black; abdomen yellow mixed with brown and black and with whitish segmental rings. Forewing whitish suffused in parts with yellow and thickly irrorated with black; a double oblique fuscous postmedial line filled in with whitish from costa to vein 3, with fulvous orange suffusion before it, met at vein 3 by an oblique fulvous orange streak from origin of vein 2; a whitish streak from middle of inner margin, bent upwards to submedian fold in which it extends to the terminal band, some fulvous orange above it below origin of vein 2; an orange terminal band defined on inner side by a black line with a white line before it from costa to the whitish streak; cilia brownish white with a fuscous line near base. Hindwing orange, the base whitish with a diffused brown subbasal line; a diffused double brown medial line filled in with white; a white subterminal band defined on inner side by diffused brown and on outer by a black line; some slight black striæ before the black terminal line forming at apex two spots with a white point between them: cilia brownish white; the underside paler, the subterminal band arising at discal fold.

Habitat.—MADRAS, Nilgiris (Andrewes). *Exp*. 18 mill. Type in B. M.

4681*a*. OLIGOSTIGMA CHRYSOZONALIS, n. sp.

♀. Head and thorax ochreous white; abdomen brownish ochreous with white segmental lines, the ventral surface white. Forewing brownish ochreous; a round orange discoidal spot defined by fuscous, a black point above it on costa, an indistinct oblique whitish band from before it to vein 1 and some whitish beyond and below it, an obscure orange streak on medial part of vein 1; postmedial line slight, dark, slightly defined by whitish on outer side, erect from just below costa to vein 2, then bent outwards to inner margin near tornus where it is met by a black line from median nervure just before end of cell, bent outwards below submedian fold, a golden yellow terminal band with fine black line on its inner edge from just below costa to above tornus with a white band before it with dark line on its inner edge; a terminal series of black points. Hindwing white; a fuscous brown band from costa beyond middle to inner margin near base;

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

a golden yellow terminal band with dark line on its inner edge excurved below costa, then slightly sinuous ; two black terminal lines with some white between them, the inner slight and with some whitish before it at apex and from the lobe to tornus, both interrupted at the lobe on which there are two black points with silvery white points before them : cilia white with slight fuscous line through them and some fuscous at the lobe.

Habitat.—Madras, Palnis (Campbell). *Exp.* 24 mill. Type in B. M.

4700*a*. Daulia argyrostrotalis, n. sp.

♂. Head and tegulæ orange ; palpi brownish at base ; frons brownish with slight white lateral line ; antennæ brownish ; thorax brownish mixed with silvery white ; abdomen white irrorated with brown. Forewing brownish grey irrorated with silvery scales and with obscure orange rufous markings; some orange rufous on basal area, a rather diffused antemedial line, a discoidal lunule and a diffused incurved postmedial band; the terminal area rather yellower with a silvery subterminal band on it. Hindwing brownish grey irrorated with silver ; some orange yellow below and beyond lower angle of cell ; a small dark spot below the angle of cell and another above tornus ; a diffused incurved dark band from costa beyond middle to termen at vein 2 towards which it has some silver markings on it ; a silver terminal band from below apex to vein 2 with some yellow before it, cilia yellow with brown tips from apex to vein 2, then pale.

Habitat.—Ceylon, Maskeliya (Alston). *Exp.* 26 mill. Type in B. M.

Genus Cenoloba.

Cenoloba, Wlsm. Ent. Mo. Mag. xxi, p. 175 (1885).

Type *C. obliteralis*, Wlk., from Australia.

Proboscis fully developed ; palpi porrect, typically extending about three times length of head and with the 3rd joint porrect, the 2nd joint fringed with hair below produced to a point at extremity, the 3rd naked ; maxillary palpi about half the length of labial palpi, typically triangularly scaled ; frons rounded ; antennæ minutely serrate and ciliated. Forewing elongate, narrow, the termen deeply cleft to one half, the segments lanceolate ; vein 1 simple ; 2 and 3 stalked ; 4 from angle of cell ; 5, 6 obsolete ; 7 from upper angle ; 8, 9, 10, 11 stalked. Hindwing elongate and gradually dilated, the termen deeply cleft, the segments lanceolate ; vein 2 from before angle of cell ; 3, 4 stalked from angle ; 5 to base of cleft from middle of discocellular ; 6, 7 shortly stalked ; 8 anastomosing with 7 to three-fourths of wing.

4751*d*. Cenoloba taprobana, n. sp.

Palpi about twice the length of head, the 3rd joint set on at an angle ; maxillary palpi almost filiform.

White ; antennæ yellowish ; tarsi with brownish rings. Forewing with some dark points on costa ; indistinct yellowish antemedial, medial and

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

postmedial bands from below costa to inner margin; a slight dark discoidal striga on outer edge of the medial band; the extremity of the lower lobe yellowish. Hindwing with antemedial and postmedial yellowish bands, the extremities of the lobes yellowish.

Habitat.—Ceylon, Trincomali (E. E. Green). *Exp.* 10 mill. Type in B. M.

Pyraustinæ.

4768*a*. Massepha rufescens, n. sp. (Pl. G., f. 44).

Hindwing with veins 4, 5 strongly stalked.

♀. Head, thorax and abdomen dark-brown mixed with yellowish white the frons and head between antennæ paler; palpi yellowish white, the 1st and 2nd joints banded with brown; legs yellowish white tinged with brown. Forewing reddish brown irrorated with dark brown on inner area; the costa and terminal area pale yellow; antemedial patches of diffused black scales below the cell and vein 1; a discoidal whitish patch with a brown striga on discocellulars; an oblique brown postmedial line defined on outer side by a whitish band. Hindwing red-brown, the basal half irrorated with dark-brown and greyish scales; an indistinct oblique dark discoidal spot; an indistinct sinuous brown postmedial line faintly defined on outer side by greyish; the apex pale yellow; the underside whitish, the costal half suffused with brown, a dark spot in cell near base and prominent discoidal lunule, the postmedial line more distinct.

Habitat.—Madras, Nilgiris (Andrewes). *Exp.* 16 mill. Type in B. M.

4783. Rehimena phrynealis.

Larva. Pale grass-green; skin semi-transparent; somites well-defined; dorsal stripe slightly darker green; a few fine black specks on the head and 2nd somite; ventral surface and legs much paler; head ochreous yellow. Feeds spun up in the leaves of a creeper. (W. H. Campbell.)

4850*a*. Nosophora mesosticta, n. sp.

♂. Head and thorax brown, the frons, vertex of head and tegulæ with some whitish; pectus and legs ochreous white with some brown; abdomen brown with white dorsal bar at base, the ventral surface white. Forewing brown; a small white spot in middle of cell and a bar beyond the cell expanding into a rounded patch between veins 4 and 2. Hindwing brown with round white spot beyond the cell.

Habitat.—Assam, Khásis. 1 ♂ type. *Exp.* 28 mill.

4834*a*. Bocchoris albinalis, n. sp.

Head and thorax pure white, the patagia with rufous point; fore tibiæ with rufous band at extremity; abdomen white dorsally tinged with rufous. Forewing pure white; a subbasal rufous striga from costa and slight curved mark above inner margin; antemedial line double, rufous, oblique and sinuous; medial line double, rufous, enclosing a rufous discoidal

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

striga, the inner line incurved and the outer line excurved below the cell; postmedial line rufous, double towards costa, excurved to vein 3, then incurved; subterminal line rufous, incurved, from costa to vein 3, a rufous terminal line; cilia with a slight rufous line at middle. Hindwing semihyaline white; a double rufous medial line arising below costa, obliquely curved and enclosing a white discoidal bar; postmedial line rufous, slightly excurved at vein 5 and ending at vein 2 on the sinuous rufous subterminal band; a rufous terminal line and fine rufous line near base of cilia.

The Muscat specimen has the subterminal line of forewing continued to inner margin and closely approximated to the postmedial line; the postmedial line of hindwing double, the line through the cilia of both wings stronger and the cilia of forewing tinged with rufous at apex and middle.

Habitat.—Arabia, Muscat (Jayaker); Bombay, Kutch (Swinhoe). *Exp.* 18-20 mill. Type in B. M.

4878*a*. Phryganodes stygialis, n. sp.

Abdomen of male slightly dilated towards extremity with exsertible dorsal fringe of white hair, the anal segment very long.

♂. Head, thorax and abdomen deep fuscous brown; palpi white at base; pectus, legs and ventral surface of abdomen white, the fore legs fuscous in front, the fore tibiæ and tarsi banded with white. Forewing deep fuscous brown; a minutely waved blackish antemedial line; a small black spot in middle of cell and discoidal lunule; postmedial line black, incurved below costa, bent outwards and minutely dentate between veins 5 and 2, then bent inwards to below end of cell and sinuous to inner margin. Hindwing deep fuscous brown with a slight greyish tinge; postmedial line blackish, oblique and minutely waved from costa to vein 2, then bent inwards and sinuous to inner margin; the underside whitish tinged with brown, a small black discoidal spot, the postmedial line not waved.

Habitat.—Ceylon, Maskeliya (Alston), Haputale (Alston). *Exp.* 30 mill. Type in B. M.

4894*a*. Dichocrocis macrostidza, n. sp.

Head, thorax and abdomen orange-yellow; tegulæ, shoulders and patagia with black spots; fore coxœ and fore and mid femora blackish the fore tibiæ and the tarsi banded with black; abdomen with dorsal and subdorsal series of black spots, the anal tuft of male black. Forewing orange-yellow; a black spot at base of costa; antemedial black spots at costa, below cell and on inner margin; a black spot in middle of cell and discoidal bar; an oblique postmedial maculate band from costa to discal fold and an incurved series of three spots from below lower angle of cell to inner margin; an oblique series of seven spots from below costa towards apex to inner margin and three subterminal spots between veins 3 and 2. Hindwing orange-yellow; a black discoidal spot and two obliquely

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

placed spots above middle of inner margin; three obliquely placed post-medial spots from below costa to discal fold, a series of eight spots from below costa towards apex to above tornus, and three subterminal spots between veins 5 and 2.

Habitat.—Burma, Rangoon (Scott), Khyen Hills (Watson). *Exp.* 28·32 mill. Type in B. M.

4911*a*. Nacoleia pachytornalis, n. sp.

Hindwing of male with groove in submedian fold on upperside, the underside with tuft of long pinkish hair from base of inner margin, the inner area forming a large hollowed out vesicle towards tornus, with small curved tuft of hair at middle of vein 1 and fringes of thick scales towards tornus.

♂. Head ochreous; thorax grey suffused with purplish brown; abdomen brownish ochreous; palpi whitish at base and with brown band at middle; pectus and legs white tinged with ochreous. Forewing grey tinged with purplish and irrorated with brown; traces of a sinuous dark antemedial line; a dark discoidal lunule constructed at middle; postmedial line dark, excurved to vein 4, then bent inwards to lower angle of cell and oblique to inner margin; cilia grey and fuscous with a pale line at base. Hindwing brownish grey irrorated with fuscous except on costal area; an ill-defined whitish antemedial band; a dark postmedial line, excurved to vein 4, then bent inwards to lower angle of cell: cilia fuscous with whitish lines at base and middle; the underside yellowish white with indistinct curved dark postmedial line.

Habitat.—Madras, Horsleykonda (Campbell). *Exp.* 20 mill. Type in B. M.

4920*a*. Nacoleia ochrizonalis, n. sp.

Head brown mixed with ochreous; palpi ochreous with blackish band on second joint; thorax cupreous brown; pectus and legs ochreous, the fore tibiæ with blackish band; abdomen cupreous brown, the extremity and ventral surface ochreous. Forewing cupreous brown, the costa except towards base and the termen and cilia ochreous; antemedial line rather diffused, oblique from costa to median nervure; a black point in middle of cell and small discoidal lunule; postmedial line rather diffused, blackish, at vein 4 bent inwards to below angle of cell, then erect. Hindwing cupreous brown, the termen and cilia ochreous; a blackish discoidal striga; postmedial line indistinct, blackish, slightly bent outwards between veins 5 and 2, then bent inwards and oblique to above tornus.

Habitat.—Sikhim (Pilcher); Assam, Khásis. *Exp.* 30 mill. Type in B. M.

4928*a*. Nacoleia fuscifusalis, n. sp.

Head, thorax and abdomen fulvous yellow mixed with fuscous; palpi black, white at base; pectus, legs and ventral surface of abdomen white,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

the fore tibiæ with fuscous band. Forewing fulvous yellow irrorated and suffused with fuscous especially on basal area and terminal area except above tornus ; antemedial line blackish, bent outwards at median nervure, a small annulus in middle of cell and discoidal lunule defined by blackish ; terminal half of costa with short black streaks ; postmedial line black, incurved at discal fold, excurved between veins 5 and 2, then retracted to below end of cell and again excurved above inner margin, a blackish patch beyond it above inner margin and the terminal area blackish from apex to vein 3 ; a terminal series of small black spots ; cilia yellow with a black line near base and some fuscous at middle. Hindwing fulvous yellow, the terminal area suffused and irrorated with blackish except a patch below middle ; some black at extreme base and a black discoidal spot ; postmedial line black, excurved between veins 5 and 2, then retracted to below the discoidal spot and straight to inner margin ; a series of black points just before termen : cilia yellow with some fuscous at middle ; the underside with the blackish on terminal area confined to apical area.

Habitat.—Ceylon, Rambukkhana (Alston) ; Woodlark I. (Meek). *Exp.* 14 mill. Type in B. M.

4928*b*. Nacoleia leucosemalis, n. sp.

♂. Head, thorax and abdomen pale yellow mixed with black except on terminal half of abdomen which has a black bar at base of anal segment and lateral series of black points ; antennæ ringed with black ; pectus, legs and ventral surface of abdomen whitish, the fore tibiæ with blackish band. Forewing yellow thickly irrorated with black, the costa and termen less thickly irrorated ; a subbasal black striga from costa ; antemedial line black, waved ; a white spot in middle of cell and narrow discoidal lunule defined by black ; postmedial line blackish with black spot at costa, excurved between veins 5 and 2, then retracted to below the discoidal lunule and straigth to inner margin ; a terminal black line from apex to vein 3. Hindwing yellow thickly irrorated with black except at termen ; a small black discoidal spot, sinuous blackish postmedial line, and slight blackish terminal line from apex to vein 3 ; the underside with the postmedial line excurved between veins 5 and 2.

Habitat.—Ceylon, N. Centr. Province (Pole). *Exp.* 12 mill. Type in B. M.

4942*b*. Nacoleio conisota, n. sp.

♀. Head, thorax and abdomen pale reddish brown, the head and front of thorax tinged with black ; palpi white at base ; pectus, legs and ventral surface of abdomen pale. Forewing ochreous suffused with reddish brown and irrorated with fuscous, the basal half of costal area blackish ; antemedial line dark, excurved in submedian interspace ; a black point in middle of cell and two discoidal bars ; some black points on medial part of costa ; postmedial line black, excurved between veins 5 and 2, then retracted to below end of cell and excurved above inner margin ; a

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

terminal series of blackish points. Hindwing ochreous tinged with red-brown and irrorated with fuscous; a small blackish discoidal spot; post-medial line blackish, excurved between veins 5 and 2, then retracted to below end of cell and oblique to tornus; a terminal series of blackish points.

Habitat.—Madras, Nilgiris (Andrewes). *Exp.* 22 mill. Type in B. M.

4942*c*. Nacoleia megaspilalis, n. sp.

Head and thorax cupreous brown mixed with white; abdomen banded white and cupreous brown. Forewing whitish; the basal area suffused with cupreous brown; an oblique, slightly irregular dark antemedial line; a quadrate cupreous brown spot in middle of cell conjoined to another below the cell; a equadrate cupreous brown patch in and beyond end of cell with small spot above it on costa and another beyond it on costa; postmedial line rather diffused and maculate, oblique from costa to vein 5, bent outwards and somewhat dentate between veins 5 and 2, then retracted to below angle of cell; terminal area suffused with brown and with a white patch between veins 5 and 2 leaving two small wedge-shaped brown spots on termen. Hindwing white; a diffused brown line close to base; a discoidal point; a diffused rather maculate medial line; a diffused rather maculate postmedial line bent outwards and somewhat dentate between veins 5 and 2; teminal area suffused with brown and with white patch between veins 5 and 2 leaving two small wedge-shaped brown spots on termen.

Habitat.—Madras, Horsleykonda (Campbell); Queensland, Dawson Dist. Ranöe (Barnard). *Exp.* 20 mill. Type in B. M.

4983*a*. Sylepta agraphalis, n. sp.

Sylepta denticulata, Hmpsn. Moths Ind. iv., p. 338 (part).

♂. Head, thorax and abdomen grey-brown, the head whiter; palpi black, white at base and tips; pectus, legs and ventral surface of abdomen whitish. Forewing grey-brown; a slight dark antemedial mark on costa and oblique whitish line defined on outer side by fuscous from cell to inner margin; a small whitish spot at middle of cell and curved discoidal striga both defined by fuscous; postmedial line represented by a small fuscous spot at costa with two small whitish spo s below it, then by a series of small fuscous spots with whitish points on their outer side, excurved between veins 5 and 2, then bent inwards to below end of cell and oblique to inner margin; a terminal series of minute blackish points and a fine pale line at base of cilia followed by a dark line. Hindwing grey-brown; an oblique dark discoidal striga; a slight dark postmedial line defined on outer side by whitish, bent outwards between veins 5 and 2, then retracted and oblique to above tornus; a terminal series of blackish striæ and fine pale line at base of cilia.

Habitat.—Bhutan (Dudgeon); Assam, Khásis. *Exp.* 32 mill. Type in B. M.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

4989*a*.—Sylepta microsema, n. sp.

♂. Head and thorax dull greyish brown; palpi fuscous, white at base, bdomen pale brown; pectus, legs and ventral surface of abdomen white, the fore tibiæ with slight fuscous band. Forewing brown with a slight cupreous tinge; antemedial line indistinct, dark, oblique, from costa to median nervure, then more erect; a pale point in middle of cell and slight whitish discoidal lunule both defined by dark-brown; postmedial line dark-brown, slightly incurved below costa and oblique to vein 2, then retracted to below end of cell and excurved at vein 1. Hindwing brown with a slight cupreous gloss; a faint dark discoidal bar; postmedial line very indistinct, dark, slightly excurved between veins 5 and 2, then retracted to below end of cell and oblique to above tornus; the underside brownish white.

Habitat.—Ceylon, Puttalam (Pole); Singapore (Ridley); Louisiades, St. Aignan (Meek). *Exp.* 28 mill. Type in B. M.

4990. Sylepta adductalis.

Larva.—Attenuated at extremities, the divisions of somites strongly marked, dull pinkish green; head small, dull green. Feeds spun up in the leaves of *Balsam*. (W. H. Campbell.)

4994. Sylepta pseudovialis, n. sp.

Sylepta ovialis, Hmpsn. Moths Ind. iv, p. 340 (nec. Wlk.)

Head, thorax and abdomen fuscous brown with a slight cupreous gloss; palpi black-brown, white at base; pectus, legs and ventral surface of abdomen white, the fore tibiæ with fuscous band at extremity and the tarsi tinged with fuscous above. Forewing fuscous brown with a slight cupreous gloss; traces of a whitish antemedial line from cell to inner margin with a more or less distinct spot beyond it in cell; a quadrate white spot in end of cell; postmedial line forming an eliptical white spot from below costa to vein 5 where it is very slightly bent outwards, then slight, whitish, at vein 2 bent inwards to below end of cell, then more distinct and slightly excurved. Hindwing fuscous brown with a cupreous gloss; a faint dark discoidal lunule; postmedial line with small white spot below costa, then slight, whitish and bent outwards between veins 5 and 2, then bent inwards to below end of cell and more distinct and oblique to above tornus; cilia with a fine white line at base; the underside with the basal and inner areas whitish, a dark point in middle of cell and discoidal lunule, the postmedial line more distinct.

Habitat.—Sikhim (Dudgeon, Pilcher); Bhutan (Dudgeon); Assam, Khásis; Ceylon (Green); Borneo, Sarawak (Shelford), Pulo Laut (Doherty). *Exp.* 30 mill. Type in B. M.

5008*a*. Glyphodes capriniodes, n. sp.

Head, tegulæ and shoulders fulvous brown, the rest of thorax white; palpi white at base and in front; pectus, legs and abdomen white; the fore tibiæ fulvous. Forewing semihyaline white, the costal area fulvous

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

brown indented by a slight white striga at discocellulars; a series of fuscous striæ just before termen. Hindwing semihyaline white with a fine fuscous line just before termen.

Habitat.—PUNJAB, Manpuri; BOMBAY, Ratnagiri (Jayaker); BURMA, Tenasserim, Donaut Hills, (De Nicéville); ANDAMANS. *Exp.* 36-40 mill. Type in B. M.

5010*a*. GLYPHODES ATHYSANOTA, n. sp.

♂. Yellow-green; palpi fulvous, white at base, and at tips of maxillary palpi; frons fulvous and white at sides; antennæ with the tuft before the excision yellow at tip; shoulders with fulvous streaks; pectus and ventral surface of abdomen white; the fore tibiæ banded with fulvous, the mid tibiæ streaked with fulvous above at base; anal tuft fuscous and white. Forewing with the costa reddish brown; a black discoidal point; cilia reddish brown, white at tips. Hindwing with the costal and inner areas white; cilia red-brown, white at tips from apex to vein 2, then wholly white.

Habitat.—MADRAS, Nilgiris (Andrewes); BR. N. GUINEA, Mafalu (Pratt), McKebea (Pratt). *Exp.* 30 mill. Type in B. M.

5184*b*. NOORDA MARGARONIALIS, n. sp.

♂. Head, thorax and abdomen pale yellow-green; palpi at tips and lower part of frons white; pectus and legs white; anal tuft fuscous. Forewing pale yellow-green, the costal edge white; cilia white at tips. Hindwing semihyaline white tinged with green; the underside with the costal area green.

Habitat.—PUNJAB, Kangra Valley, 4,500 feet (Dudgeon) 1 ♂. *Exp.* 20 mill. Type in B. M.

5196*b*. CALAMOCHROUS BIPUNCTALIS, n. sp.

♂. Head, thorax and abdomen pale ochreous yellow mixed with whitish; palpi white at base, brownish at tips; fore femora and tibiæ tinged with brown. Forewing pale ochreous yellow, the costal and inner areas tinged with brown; two obliquely placed blackish points in middle of cell; an oblique dark antemedial striga from vein 1 to inner margin; a diffused brownish discoidal lunule; the median nervure and base of veins arising from it slightly streaked with brown; a diffused brown mark beyond the cell with oblique fascia from it to apex; short dark postmedial streaks in the interspaces from vein 6 to below vein 2. Hindwing pale ochreous yellow.

Habitat.—MADRAS, Palnis (Campbell). *Exp.* 34 mill. Type in B. M.

5236*b*. PYRAUSTA METASIALIS, n. sp.

♂. Head, thorax and abdomen ochreous white irrorated with fuscous; palpi below, pectus and legs whitish, the fore tibiæ with black band at extremity. Forewing ochreous white thickly irrorated with fuscous; the costal edge blackish towards base; a curved blackish antemedial line:

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

an obscure blackish annulus in middle of cell and discoidal lunule defined by blackish; postmedial line blackish, oblique to discal fold, bent outwards between veins 4 and 2, then retracted to below end of cell and erect to inner margin. Hindwing ochreous white thickly irrorated with fuscous; a rather diffused oblique blackish antemedial line; postmedial line blackish, incurved at discal fold, then excurved and diffused to tornus; some fuscous suffusion before termen towards apex.

Habitat.—Sikhim (F. Möller). *Exp.* 14 mill. Type in B. M.

5255*b*. Pyrausta microdontalis, n. sp.

Head, thorax and abdomen white faintly tinged with reddish brown, the head and base of tegulæ rather more strongly tinged; palpi white below and blackish above; abdomen with subdorsal black points on 3rd segment; fore tibiæ with black band at extremity. Forewing white tinged with reddish brown and slightly irrorated with fuscous; antemedial line blackish, oblique from costa to submedian fold; black points at middle of cell and on discocellulars; postmedial line formed of small dentate black marks, excurved between veins 5 and 2, then bent inwards; a terminal series of slight blackish striæ. Hindwing white tinged with reddish brown and slightly irrorated with fuscous; a black discoidal point; postmedial line black, minutely dentate, bent outwards between veins 5 and 2; a terminal series of slight black striæ.

Habitat.—Ceylon, Maskeliya (Alston). *Exp.* 40 mill. Type in B. M.

5259*a*. Pyrausta monosema, n. sp.

Head, thorax and abdomen red-brown; pectus, femora and ventral surface of abdomen fuscous; antennæ tinged with fuscous. Forewing red-brown; a blackish discoidal bar; postmedial line blackish, bent outwards at vein 6, then minutely waved, excurved to vein 4, then oblique. Hindwing pale reddish brown; the underside with indistinct curved postmedial line.

Habitat.—Punjab, Lahore. (Mrs. Mulvany). *Exp.* 28 mill. Type in B. M.

ADDENDA.

Sphingidæ.

91*f*. Marumba bengalensis, n. sp.

♂. Head, thorax and abdomen pale red-brown tinged with grey, the dorsum of thorax with darker stripe; frons dark red-brown at sides. Forewing pale red-brown tinged with grey; an oblique slightly incurved antemedial line; two medial lines; some dark suffusion on inner medial area; a pale elliptical discoidal spot defined by fuscous and extending to well below the cell; a dark line just beyond the cell, oblique below vein 4; postmedial line dark, incurved to below vein 4 where it is hooked, then strongly retracted and incurved; a large chocolate brown patch on terminal area from costa to below vein 4, with incurved inner edge

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

and two conjoined obliquely placed spots from below vein 3 to tornus. Hindwing ochreous tinged with rufous; a lunulate chocolate-brown patch before termen from vein 3 to tornus ; the underside with two red-brown antemedial lines and two postmedial lines oblique from costa to between veins 3 and 4, then incurved.

Habitat.—Bengal, Chota Nagpur, Kalunga. *Exp.* 60 mill. Type in B. M.

Notodontidæ.

221*c*. Phalera diversa, n. sp.

Antennæ of male bipectinate to two-thirds length.

♂. Head and thorax dark-brown mixed with grey especially on patagia and metathorax; abdomen dark-brown, the ventral surface with grey mixed. Forewing dark-brown with grey mixed; an oblique sinuous black subbasal line and erect sinuous medial line; a narrow white discoidal lunule; some white irroration on postmedial part of costa; postmedial line black, arising below costa, sinuous, incurved below the cell where there is some brownish grey before it and bent outwards between veins 4, 3; a dentate blackish subterminal line arising from apex towards which it is oblique and diffused, incurved between veins 6 and 4, where there is a brownish grey patch beyond it followed by slight black streaks on the veins, then indistinct, dentate and slightly defined on outer side by brownish grey; a crenulate blackish terminal line. Hindwing dark reddish brown, the cilia whitish at tips; the underside with rather diffused postmedial line and the terminal area slightly irrorated with grey.

♀. Forewing suffused with pure white to postmedial line except on inner area, some white on terminal area below apex.

Habitat.—Bombay, Kanara, Karwar. *Exp.* ♂ 56, ♀ 76 mill. Type in B. M.

265*a*. Stauropus chlorotricha, n. sp.

♂. Head and thorax dark-brown mixed with grey-white; palpi black-brown, whitish in front; pectus and legs whitish tinged with red-brown, the tarsi ringed with red-brown; abdomen dark-brown, the basal crests with a few whitish scales, the ventral surface whitish suffused with red-brown. Forewing dark reddish brown overlaid with golden-green hair-like scales; faint braces of waved dark antemedial, postmedial and subterminal lines. Hindwing dark red-brown, the apical part of costal area overlaid with golden-green hair-like scales and with a paler green bar just before apex; the underside white faintly tinged with red-brown.

Habitat.—Sikhim (F. Möller). *Exp.* 44 mill. Type in B. M.

Drepanidæ.

706*a*. Leucodrepana furvicosta, n. sp.

Head, thorax and abdomen pure white; palpi, frons and antennæ

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

fulvous; forelegs brownish in front. Forewing pure white, the costal edge fulvous; traces of two oblique waved lines formed of blackish scales from below middle of costa to inner margin and of two similar subterminal lines, and of a line just before termen. Hindwing pure white with traces of a waved antemedial line formed of dark scales, of two similar postmedial lines, and of a line just before termen.

Habitat.—Sikhim Tibet, Yatung (Hobson); Sikhim (F. Möller). *Exp.* 30 mill. Type in B. M.

720*a*. Drepana bicostata, n. sp.

♂. Head blackish; thorax pale violacious brown; pectus and legs greyish ochreous, the forelegs tinged with brown; abdomen greyish, the ventral surface ochreous white. Forewing pale violaceous brown; antemedial and postmedial red-brown patches on costa, the former with slightly incurved fulvous line from it to inner margin; an oblique fulvous subterminal line; the costal area towards apex, the termen and cilia to vein 3 suffused with red-brown. Hindwing ochreous yellow, the inner area greyish with a fulvous postmedial bar; the underside with some greyish on costal area beyond middle and a slight postmedial bar.

Habitat.—Sikhim (F. Möller). *Exp.* 28 mill. Type in B. M.

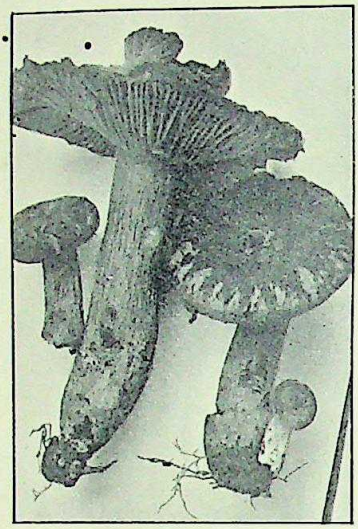
(*To be continued.*)

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

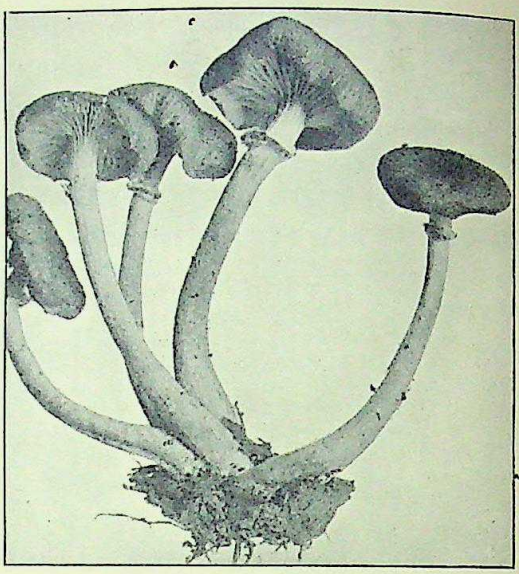
Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

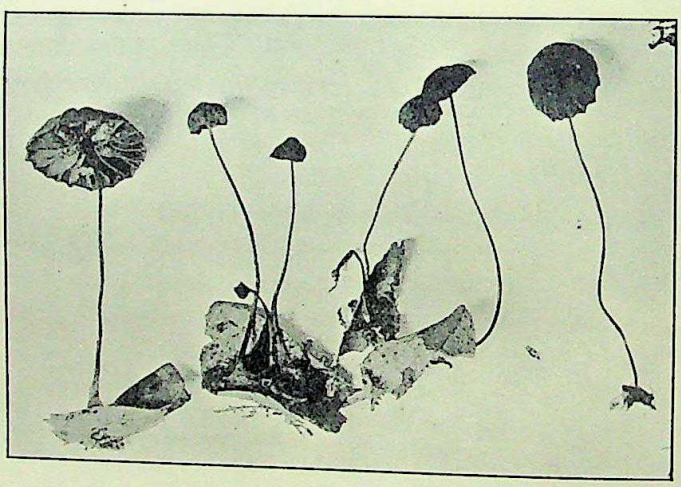
Digitized by Arya Samaj Foundation Chennai and eGangotri



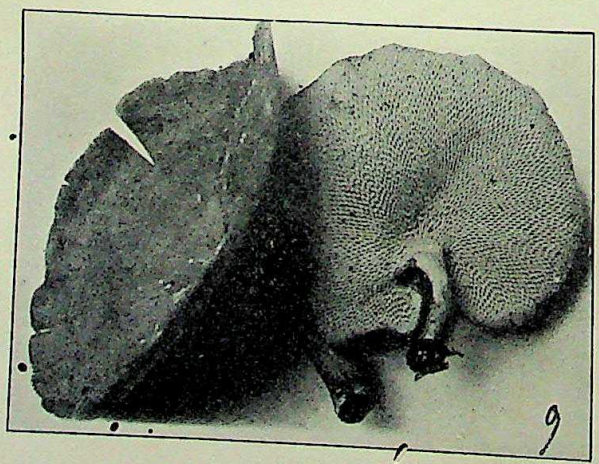
A



B



C



A.—*Russula Theissenii.*

B.—*Armillaria mellea.*

C.—*Marasmius subrhodocephalus.*

D.—*Favolus ciliaris.*

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

THE FÛNGI OF INDIA

BY

F. Theissen, S. J.

Part I.

(With Plates I to IV and text figures 1 *to* 10.)

The fungal flora of India, especially of the Bombay Presidency, has received very little attention up to now. Whilst collections on a larger scale were made in Ceylon, Australia, and New Zealand, we possess, with regard to the Indian mycoflora, but short notices which appeared at great intervals in the scientific journals of the last forty years. It was only during the last ten years that larger collections were made by Mr. W. Gollan, the Superintendent of the Royal Botanic Gardens at Saharanpur, the Rev. E. Blatter, Professor of Botany at St. Xavier's College in Bombay, and quite recently by the Imperial Mycologist, Mr. E. J. Butler, whose extensive materials have been described by Messrs. H. and P. Sydow in the Annales Mycologici of 1906, 1907 and 1911.

It is not difficult to understand, why the Indian mycoflora has been so much neglected in the past. As it happens very rarely that scientific expeditions, composed of specialists, select India as the field of their explorations, mycologists in Europe have to depend entirely on the good-will and the initiative of amateurs. Much has already been done in this respect by Europeans residing in India, but we feel convinced that many more would be willing to contribute towards the exploration of that vast and interesting country, if they knew how to gather and prepare specimens. We trust, therefore, that a few practical hints for collectors will be welcome.

As to the literature on Indian fungi, we refer to the 'Bibliography of the Botany of British India and Ceylon' by E. Blatter, which appeared in Vol. XX, No. 5 of this Journal, p. lxxix—clxxxv.

I

A Few Hints for Collectors.

1. How to distinguish fungi.

Fungi may easily be distinguished from other cryptogamic

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

plants, such as lichens and algæ, by the absence of the green colouring matter, called chlorophyll. It is for this reason that they assume all possible colours, except green. Being devoid of chlorophyll they cannot assimilate carbon dioxide, but must take up their carbonaceous food in the form of rather complex compounds, which they find on living or dead organic substances *v. g.* leaves, wood, dung, humus, decayed fruits, paper, insects, etc. Accordingly, some are parasitic, such as the Rusts and Smuts, and absorb those complex carbon-compounds from other living organisms, whether plants or animals. Others are saprophytic, absorbing those compounds from the remains of dead organisms as, *v. g.* the numerous and often large mushrooms which grow on humus or leaf soil in forests,—or from organic substance formed by living organisms. Examples of the latter are the Yeasts and Moulds which make their appearance on juicy fruits, saccharine liquids, etc.

This is not the place to give a systematic account of the different classes of fungi. We shall confine ourselves to giving the general characteristics of some more important groups.

Excluding from the outset the Schizomycetes (*v. g.*, Bacilli), Myxomycetes and Phycomycetes, we shall consider the fungi known as Mushrooms, Toadstools, Puffballs, Yeast, Moulds, Mildews, Rusts and Smuts.

These may be divided into two classes, the Basidiomycetes and Ascomycetes. In the Basidiomycetes the spores are borne free on so-called basidia (Fig. 1), whilst in the Ascomycetes the spores,

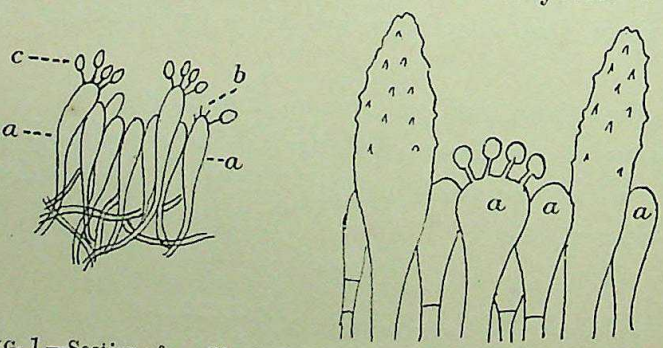


FIG. 1.—Section of a gill of an Agaric (left) and of a pore of a Polyporus (right), showing the basidia (a) which bear on 4 sterigmas (b) the 4 spores (c).

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

usually 8 in number, are included in a sack, called ascus (Fig. 2)

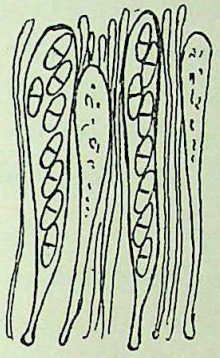


FIG. 2.—Section of the hymenium of an Ascomyces, showing the asci with 8 bicellular spores.

A.—BASIDIOMYCETES.

Omitting for a moment the Uredinales (Rusts, Smuts), we divide the Basidiomycetes into two very natural orders; the Hymenomycetes and Gastromycetes.

In the Hymenomycetes (*v. g.*, the common Mushroom) the basidia with the spores are exposed and free from the beginning, or at least from a very early state. In the Gastromycetes the basidia are developed in cavities within the tissue of the plant (Puff-Balls for instance).

Hand in hand with this internal anatomical structure, the various families show distinct outer morphological characters. In order to distinguish them it is, therefore, not necessary, to make a minute microscopical examination.

I.—Hymenomycetes.

1. **Agaricaceæ**.—Agarics, the common Mushroom. (Plate I, A, B, C).*

---

* Figures A, B, D of Pl. I, A of Pl. III, from Rick. Contributio ad Monogr. Agar. et Polyp. Broteria, 1907.
Fig. C of Pl. I. Theissen, Marasmii austro-brasilienses, Broteria, 1909.
,, of Pl. II. ,, Polyporaceæ austro-brasilienses, Denkschr. Acad. Wien, 1911.
,, B of Pl. III. Lloyd, Hexagona.
,, A, D of Pl. V and A of Pl. VI. Lloyd, Phalloids.

[*See over*]

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Usually fleshy, somewhat umbrella-shaped, when stalked, or fan-shaped when sessile. Consists generally of a stalk, termed the stipe, bearing at its apex a large circular expansion, the pileus (hat). On the underside of the pileus are a number of radiating plates of tissue (lamellæ) on which are developed the microscopic basidia. Pileus and stalk vary much as regards size, shape, consistency and colour.

Habitat.—On the ground, amongst moss, on trunks, rotten wood, dead leaves.

Collectors ought to take notes regarding the following points:—Whether the pileus is furrowed or even, viscid or dry, convex or plane, umbonate in the centre or depressed, pubescent or scaly or smooth, ciliated on the margin, of what colour and size; whether the stalk is viscid, hairy, striped; colour of the lamellæ.

2. **Polyporaceæ.**—(poly=many, porus=pore, hole). The Dry Rot of timber is caused by members of this family. (Plate I, D; Plate II; Plate III, A, B; Plate IV, A.)

Plants of all possible shapes; fleshy, cartilaginous, or tough like wood, forming thin crusts, shapeless lumps, or umbrella-shaped like Agarics, or with the stalk-less pileus reflexed. They differ, however, from the Agarics by bearing the basidia not on radiating lamellæ, but in alveolar (honey-comb-like) pits or tubes.

Habitat.—On rotten wood, branches, stumps (seldom on living trees), or on the ground.

Characters to be noted.—Colour of pileus and tubes; surface even or striped.

---

* (*contd.*)

Fig. 3 and D of Pl. VI. Grevillea, I.
„ B, C of Pl. VI. Durand, Geoglossaceæ, Ann. Mycol., 1908.
„ 7 and C of Pl. VII. Theissen, Fragm. brasil. Ann. Mycol., 1909.
„ A of Pl. VIII. Theissen, Hypocreaceæ bras., Ann. Mycol., 1911.
„ A, B of Pl. VII. Starbäck, Ascom. R. Exped.
„ C of Pl. VIII and Pl. IX. Theissen, Xylariaceæ bras., Denkschr. Acad. Wien, 1910.
„ 6, 9, 10. After Spegazzini, Mycet. Arg. IV.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

3. **Hydnaceæ.**—Like the preceding, but more rarely stalked, usually resupinate (expanded) or forming a reflexed pileus. Basidia on spinous projections or teeth, which cover the under surface of the pileus, or the upper when the fungus is resupinate (Plate IV, B).

Habitat, etc., as in No. 2.

4. **Clavariaceæ** (clava=club).—In this family the special organs for the support of the basidia (like lamellæ, tubes, teeth) disappear. The basidia cover the whole surface or are limited to the upper part. The fungus is either unbranched, forming simple club-shaped bodies, or densely branched, cylindrical, or flattened and expanded, but not differentiated into stalk and pileus, cartilaginous. (Plate IV, C.)

Habitat.—On the ground or on bark.

Characters to be noted.—Colour, pubescence.

5. **Telephoraceæ.**—Light yellow, reddish or brown crusts, ear-shaped pileus, seldom stalked. Basidia equally distributed over the even smooth light-coloured surface.

Habitat.—On wood.

Characters to be noted.—Colour.

II.—Gastromyceles.

In characterizing the families of this order we follow C. G. Lloyd's excellent monograph.

1. **Phalloideæ.**—(Plate V, A, B, C.)

Plants fleshy, enclosed in a gelatinous volva when young (eggs); when mature, they bear at the top a mucilaginous mass which contains the spores.

Phalloids are known for their fœtid smell and bizarre shape. They attract the attention of the most unobserving, and are often given very appropriate names like: Stinkhorn, Stinkballs, Dead Man's Finger.

Only three colours have been observed in Phalloids: red, yellow,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

and white. Most of them are red or some shade of red, pink flesh-coloured, orange.

2. **Nidulariaceæ**.—Nest Fungi, Bird's Nests. (Plate VI, A.) Plants shaped like little cups which open at the top and contain a number of small seed-like bodies, " eggs " (sporangia).

3. **Lycoperdaceæ**.—Puff-Balls.

The ripe peridium consists of two distinct membranes (exoperidium and endoperidium), enclosing a powdery mass (spores).

(*a*) *Geastræ*. Star Puff-Ball.—(Fig. 3).—Outer membrane thick, splitting into recurving segments.

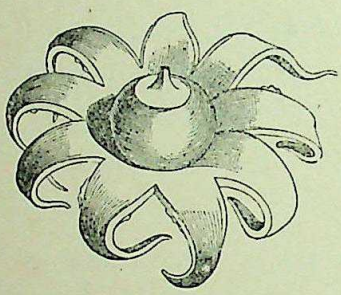


Fig. 3.—Geaster saccatus.

(*b*) *Bovistae*. Tumblers.—Outer membrane thin, not splitting into radiating segments.

(*c*) *Lycoperdæ*. True Puff-Balls.—(Plate V, D.)—Peridium flaccid, opening by a definite mouth, or rupturing irregularly and falling away in pieces.

III.—Uredinales.

This order comprises those parasites which are generally known as Rusts, on account of the rusty appearance they give to their host-plants at a certain stage of their development.

They may be distinguished with the naked eye as minute roundish or oblong brown (yellowish or black) spots (' sori ') on the leaves, or even as compact bullate pustules some mm in diameter, scattered or crowded, often hidden by the pubescence of the leaf. The surrounding tissue is often killed by the parasite, assuming the appearance of round reddish-brown or pale spots.

B.—Ascomycetes.

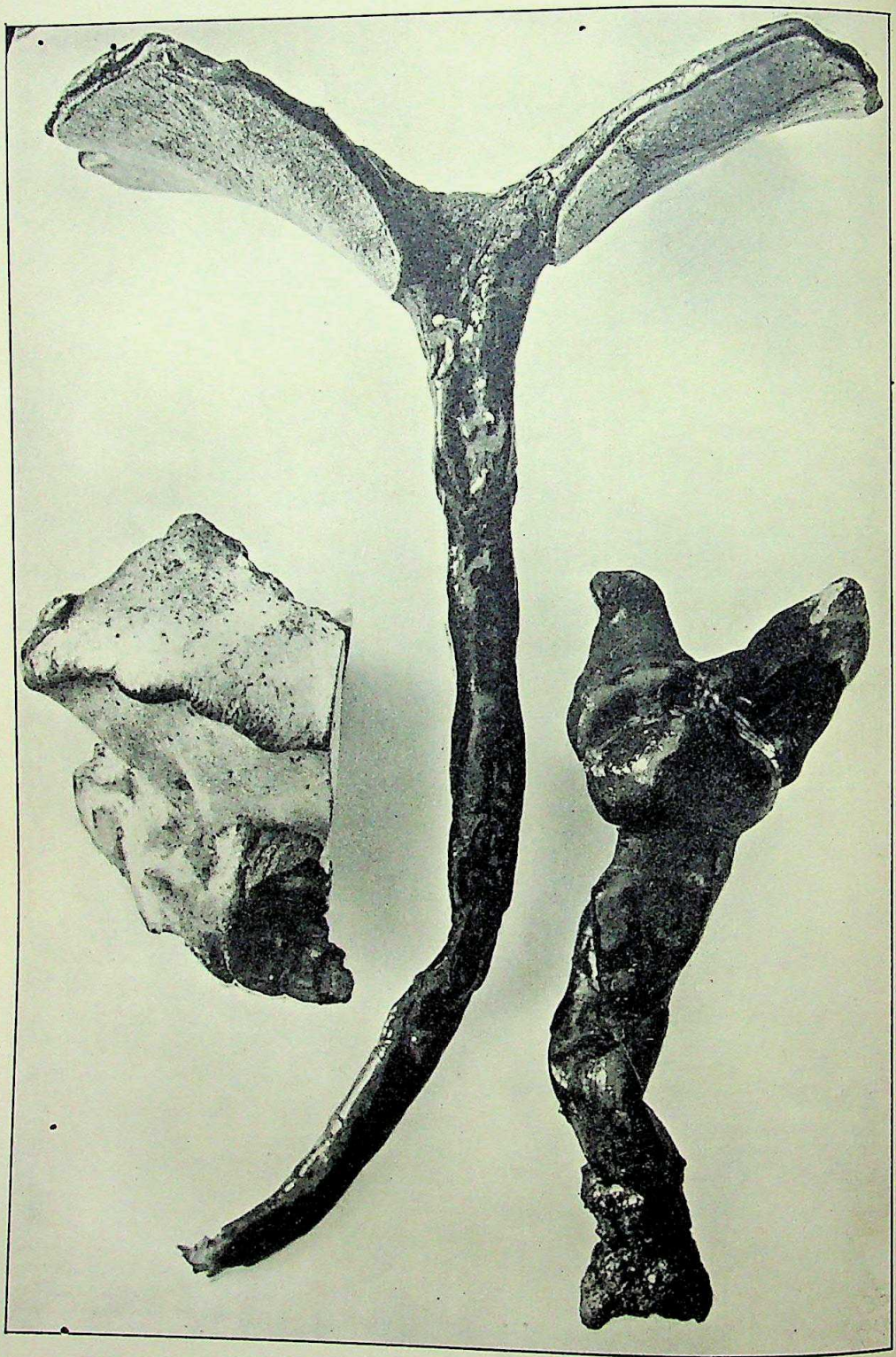
This class includes a vast number of forms. We shall mention only a few typical representatives of the chief families. Some of them, the Discomycetes, have the ' asci ' (spore-sacks) disposed on a continuous plain or disc, whilst others, the Pyrenomycetes, have them enclosed in capsules or receptacles, called ' perithecia.'

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri



Ganoderma formosissimum.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

I.—Discomycetes. (Plate VI, B, C, D and fig. 4.)

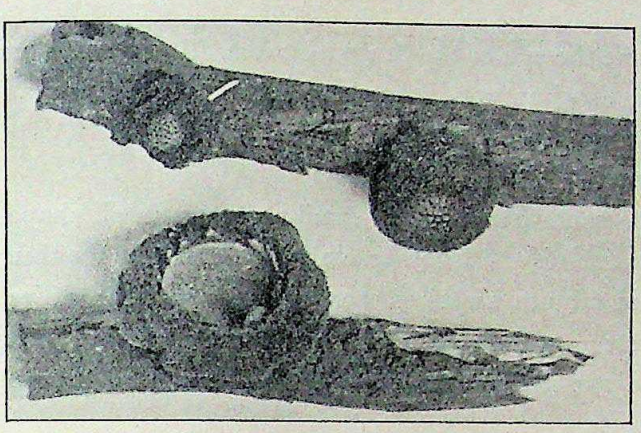


FIG. 4.—Sarcosoma Mœlleri.

Light-coloured small cups or bowls from 1 mm to several cm in diameter, or upright ears, or finally with a distinct stalk. The asci with the spores are not included in receptacles, but distributed over the whole fertile, mostly coloured surface.

In the family Geoglossaceæ this surface does not present the usual cup-shaped form, but reminds one of the club-shaped body of Xylarias.

Characters to be noted.—Colour, dimensions, pubescence.

II.—Pyrenomycetes.

1. **Perisporiales and Microthyriales.** (Fig. 5, 6 and Plate VII, A.)

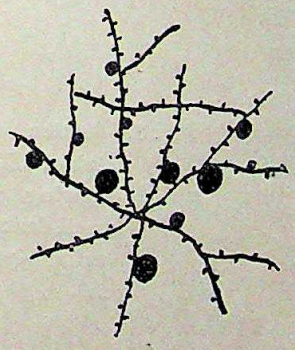


FIG. 5.—Single threads and young perithecia of an Asterina (enlarged).

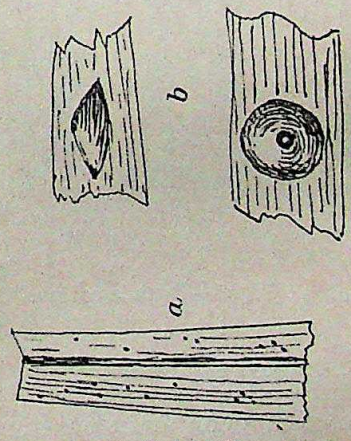


FIG. 6.—Vizella Urvilleana.
a. natural size.
b. two perithecia enlarged.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

A very interesting group, mostly leaf-fungi, growing on living and fading leaves of phanerogamic plants. The minute receptacles would escape the eye of the fungus-hunter, if they were not, as is usually the case, crowded together in a black araneous spot of densely interwoven threads.

2. **Hypocreales.**

The representatives of this family appear in all shapes of the Sphæriales (*vide* No. 4 below): clubs, pustules, diffuse thin crusts, and isolated minute scattered perithecia; but they differ by the light-coloured (white, yellowish, reddish), soft (almost fleshy) bodies, the perithecia appearing on the surface as crowded dark minute points.

The most striking species are those growing on insects and their larvæ and chrysalids. (Plate VIII, A.)

3. **Dothideales.** (Plate VII, B.)

Mostly leaf-fungi, forming shining carbonaceous circles or stripes. On branches, they produce pustulate rough black tumours, which are easily recognized.

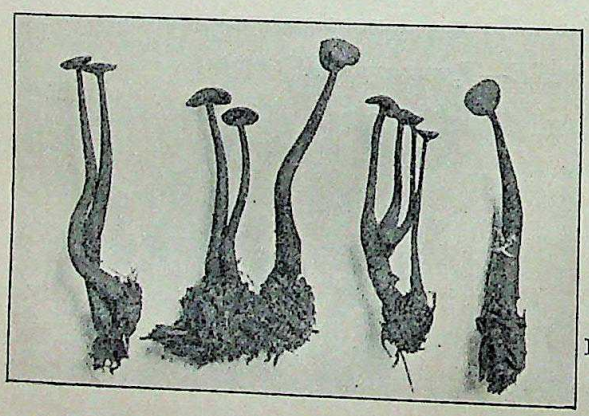


Fig 7.—Poronia oedipus.

Fig. 8.—Section of the club of a Xylaria showing the small dark receptacles (perithecia).

4. **Sphæriales.**

The most common forms are the following:—

(*a*) Receptacles (perithecia) crowded and immersed in a compact, solid carbonaceous vegetative 'stroma', black

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

on the outer side, forming club-shaped bodies, bullate pustules, or dark flat crusts. (Plate VII, C, VIII, B, C, IX and fig. 7 and 8.)

(*b*) Receptacles single or scattered, minute, superficial, and attracting the attention only when closely grouped together, or immersed in the bark, piercing the epidermis with their tips. (Fig. 9 and 10.)

In this case their presence may be noticed by dark punctiform holes in the epidermis or by the removal of the epidermis, when the black deformation produced in the cambium will at once be apparent.

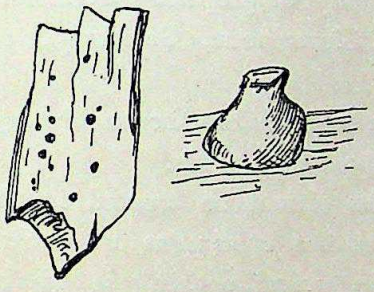


FIG. 9.—Lophiostigma xerophilum.

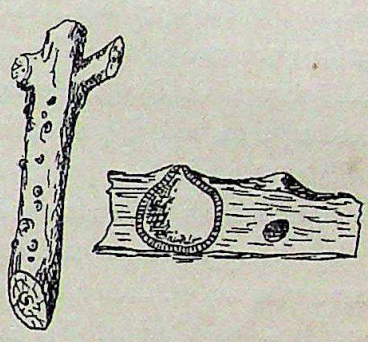


FIG. 10.—Oraniella coffeicola; natural size (left) and section (right; enlarged).

2. How to gather and preserve fungi.

GENERAL.

1. Take your notes from fresh specimens, before the fungus begins to shrivel up. As to what notes are required, see above.

2. Add the name of the locality, and of the collector, the date (rainy season or not, etc.); mention the substratum of the fungus, whether branches, stumps, leaves, ground. As to the leaf-fungi it is almost indispensable to know the host-plant.

3. Pick up as ample material as possible. There will be more chances in this case, that your material will contain not only half-developed or abnormal specimens without fructification, but also ripe and typical ones. As the various stages of development are of interest to the specialist, it will be good to gather young and old specimens.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

4. Do not break or cut off the fungus, but dig or cut it out along with its substratum. This will enable mycologists to study the method of insertion.

5. Specimens of different localities or hosts should be kept separately, even if the fungi seem to belong to the same species.

SPECIAL.

1. Leaf-fungi do not require much preparation. The leaves may be put between sheets of newspaper and pressed and dried in the ordinary way. Do not forget the name of the host-plant.

2. Fungi of hard (woody or carbonaceous) consistency should be dried in the open air. Keep them in a dry well-aired room for two or three days. This simple way of preparing specimens will always do for Thelephoraceæ, Clavariaceæ, Gastromycetes, Discomycetes and Hypocreales.

If enveloped in paper or kept in boxes before thoroughly dry, the specimens will be attacked and spoilt by moulds.

3. Big specimens of Polyporaceæ should be treated in the same manner. It often happens that fine specimens are packed and sent to Europe, but on their arrival nothing is to be found but a powdery mass. The fungus has become a prey of insects.

The practical instruction given by C. G. Lloyd in his 'Mycol. Notes, p. 36,' might be useful in this connection :—

> "The principal trouble that many have in making collections of fungi is that specimens are apt to be eaten by insects. This is very discouraging, but we have learned now how to avoid it in a very simple manner. In the old collections where specimens are pasted on sheets they have to be poisoned with a solution of corrosive sublimate and alcohol, but this is very objectionable from the fact that it changes materially the condition of the specimens and they are not in their natural condition after going through the poisoning process. It was formerly my custom when I received specimens to submit them to the fumes of carbon bisulphide, which is fatal to insect life, but I have found that while it may kill the insects in the specimens it does not kill the chrysalis, and specimens

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

submitted to the fumes may have chrysalides which will hatch out and eventually destroy the specimen. I learned from Mr. Romell of Stockholm a very simple process which is as inexpensive as it is effectual for specimens that are preserved in boxes, but of course does not apply to specimens pasted on sheets. Simply put in each box a liberal quantity of flake naphthalene. For boxes the size of No. ½ and No. 1 a teaspoonful, and for larger boxes a larger quantity in proportion. Flake naphthalene does not affect the specimens at all, but it kills the insects, not only those that may be in the plant, but those that develop afterwards. I have recently gone through our private collection of some ten thousand specimens or more and dumped into each box a sufficient quantity of this flake naphthalene. I do not anticipate there will ever be any trouble in future with insects in my collection. Flake naphthalene is comparatively inexpensive, and two or three pounds will take care of two or three hundred specimens. It costs about fifteen cents per pound."

4. As to the fleshy slender Agarics which always cause great difficulties, there are a good many species which may be treated as mentioned under No. 2. We have adopted this method with success in numerous cases, even with those species which have delicate cartilaginous stalks like Marasmius (cf. Fig. 6). But a great number of the fleshy Agarics resist any attempt to dry them. There are even some (Coprinus, etc.), which regularly melt into a black gelatinous mass as soon as they are ripe. These must be preserved in tubes filled with alcohol.

5. Of the Hymenomycetes spores should be procured. For this purpose fresh specimens must be put on a slide, or a piece of window-glass, or dark paper in such a way that the lamellæ (in Agarics) or tubes (in Polyporeæ) or teeth (in Hydnaceæ) or the smooth surface (in Telephoraceæ) look towards the glass or paper. After a few hours the spores will fall away, covering the glass with a fine layer of white or reddish powder. The glass or paper should then be wrapped up in paper and packed together with the dried specimen. Care must be taken not to mix up the corresponding powders and specimens.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

II

List of Fungi.

Note.—The area dealt with comprises British India, including Burma. Baluchistan, Ceylon, the Andaman and Nicobar Islands have not been considered.

Our present article does not include the Uredinales, Phycomycetes, Fungi imperfecti and Myxomycetes.

Many species, specially the older ones, require a critical revision It is evident from this that much of our list is only of provisional value. As to more recent critical publications we made use of C. G. Lloyd's 'Gastromyceten' and 'Polyporaceen,' and our own investigations on Microthyriaceæ, Perisporiales, and Xylariaceæ.

A.—ASCOMYCETES.

1.—Perisporiales.

Sphærotheca pannosa, (Wallr.) Lév. Syll. I, p. 3.

Locality unknown. Known from Europe and N. America.

Erysiphe communis, (Wallr.) Fr. Syll. I, p. 18.

„ **Martii,** Lév. Grevillea VI, p. 117.

Simla, on leaves of *Populus ciliata,* Wall.

Eurotium herbariorum, Link-Syll. I, p. 26.

Bengal, Chittagong, Burma ; common on various substances. (Cooke Grevill. IV, p. 117.)

Balladyna Butleri, Syd. p. 388.

On leaves of *Bambusa,* Khasi Hills.

Limacinula Butleri, Syd. p. 385.

On leaves of *Artocarpus mysorensis,* Vayitri, Wynaad.

Limacinula Theæ, Syd. et Butl., p. 386.

On leaves and branches of *Camellia Theæ,* Rungmook, Darjeeling.

Capnodium, mangiferum, C. et Br. Syll. I, p. 77.

Syn.: *Dimerosporium mangiferum,* (Cooke) Sacc. l. cit., p. 53.

On leaves of *Mangifera indica,* Mysore.

Capnodium lanosum, Cke. Grevill. VIII, p. 96.

On leaves of *Ficus,* Belgaum.

Capnodium Eugeniarum, Cke. l. cit.

On leaves of *Jambosa vulgaris,* Belgaum.

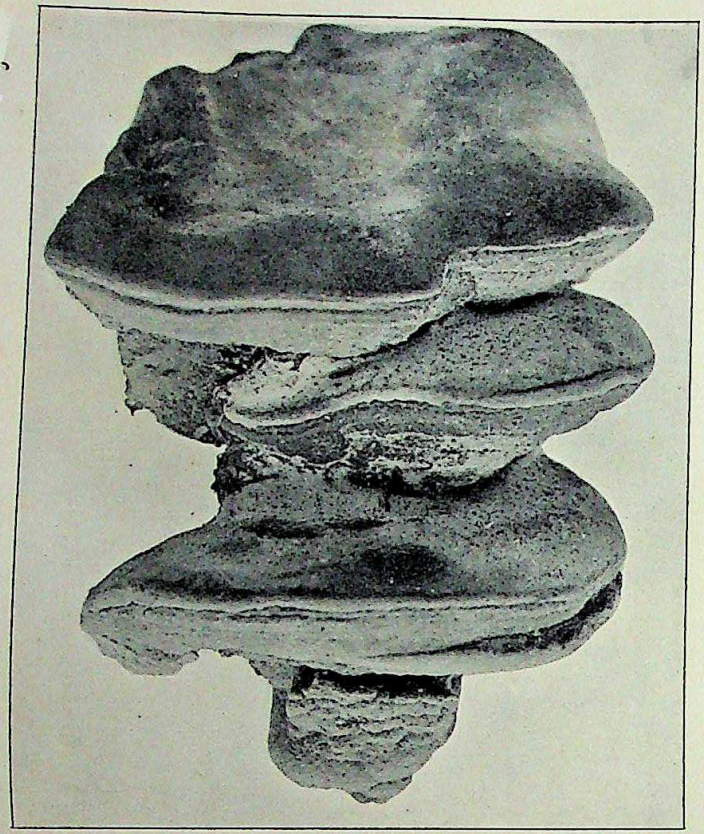
Capnodium Anonæ, Pat.—Syd., p. 384.

On leaves and branches of *Ficus retusa, Agave Vera-Cruz,* etc. Bilikere, Mysore ; on *Ficus glomerata, retusa, bengalensis,* Hassan, Mysore.

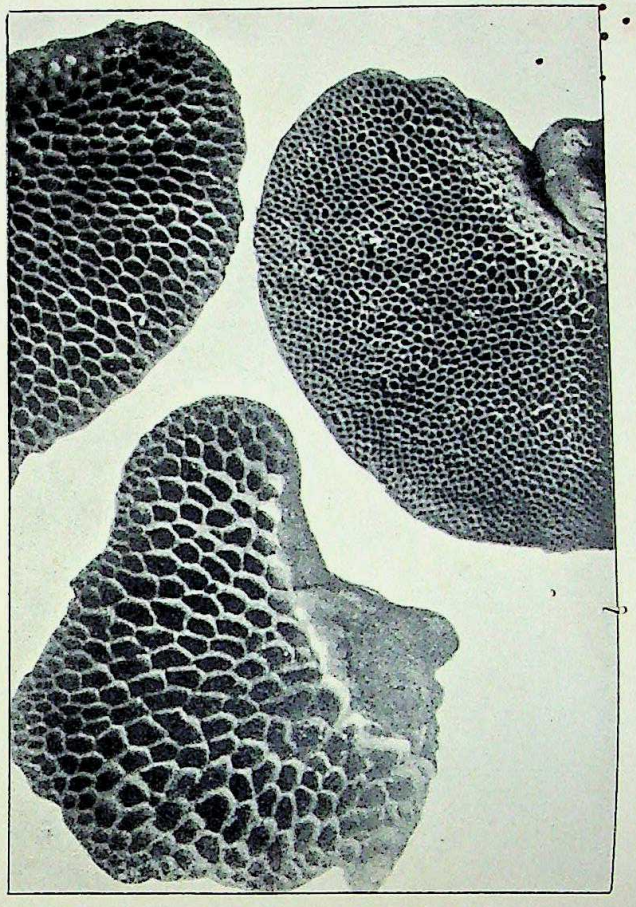
CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar



A.—*Fomes homodermus.*



B.—*Hexagona Pobeguini.*

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Digitized by Arya Samaj Foundation Chennai and eGangotri

This species was originally described from the Gambier Islands, Polynesia (Syll. XVII., p. 555).

Capnodium betle, Syd., p. 384.

On leaves of *Piper betle,* Dacca; Mudon, Amherst District, Burma.

Capnodium brasiliense, Putt.—Syd. l. cit.

On leaves and branches of, *Coffea arabica,* Tuttapullum, Nilgiris.

Parodiella perisporioides, (B. et. C.) Speg.

On leaves of some leguminous plant, Bombay (Cooke in Grevill. IV., p. 117); on cultivated (imported!) *Medicago lupulina,* Dehra Dun; on *Desmodium rufescens,* Wahjain, Assam; on *Indigofera trifoliata,* Kistna District, Madras (Syd., p. 383). The species occurs throughout the tropics.

Lasiobotrys Lonicerae, Kze. Syd., p. 384

On leaves and branches of *Lonicera,* Harwan, Kashmir; on leaves of *Lonicera,* Bhowali, Naini.

Acanthostoma Wattii, (Syd.) Theiss.

Syn. *Dimerium Wattii,* Syd., p. 383. (cfr. Theissen, Zur Revision d. G. Dimerosporium, Beih. Bot. Centr. Blatt 1912). On leaves of *Camellia Thea,* Dunmur Dullung, Sibsagar District, Assam; Darjeeling.

[**Dimerosporium Fumago,** (Niessl.) Sacc.]

Syn. *Meliola Fumago,* Niessl.

On leaves of *Celastrus,* Calcutta.

This species is *Asterina crustosa* (cfr. Theissen, Fragmenta brasilica VI. in Ann. myc. 1912).

[**Dimerosporium aterrimum,** Cke. et Wint. Grevill. XX, p. 83.]

On coriacious leaves, Manipur.

Species imperfectly known (cfr. Theissen, l. cit.).

Dimerosporium erysiphoides, Earle.

On leaves of *Cynodon dactylon,* Pusa; on *Paspalum scrobiculatum,* Bassein, Bombay Presidency. (Syd. p. 383).

Meliola zig-zag, B. et Br.

Grevill. VIII, p. 96, Belgaum; Syd., p. 383, on *Cinnamomum,* Wahjain, Assam.

Meliola densa, Cooke, Grevill. XII, p. 85.

On leaves of *Ilex* (?) Khasia.

Meliola amphitricha, Fr.

Grevill. VIII, p. 96, Belgaum; Syd., p. 379, on leaves of *Terminalia Catappa,* Auda Tode, Wynaad. This species occurs throughout the tropics.

Meliola asterinoides, Wint. var. **maior,** Gaill.

Type from Africa; Syd, p. 379, on leaves of *Webera corymbosa,* Bilikere, Mysore.

Meliola Butleri, Syd. l. cit.

On *Citrus medica* var. *acida,* Chittagong; on *Citrus decumana,* Kya-in, Amherst District, Burma.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Meliola cladotricha, Lév.

Syd., p. 380, on leaves of *Eugenia jambolana,* Cottamunda, Wynaad; on leaves, Kya, Amherst Dist.

Known originally from Borneo, New Guinea and Australia.

Meliola clavulata, Wint.

Syd., l. cit., on leaves of *Ipomoea* Tellicherry, Malabar; Pulliyanur, Travancore; on *Argyreia hirsuta,* Balehonnur, Mysore.—Known originally from Africa.

Meliola Diospyri, Syd., p. 381.

On *Diospyros montana,* Sidrabunna, Koppa, Mysore.

Meliola geniculata, Syd. l. cit.

On leaves of *Odina wodier,* Pulliyanur, Travancore.

Meliola indica, Syd., p. 382.

On *Barringtonia acutangula,* Dacca.

Meliola Mangiferae, Earle.

Syd. l. cit., on *Mangifera indica,* Pulliyanur, Travancore.—Originally known from Portorico.

Meliola palmicola, Wint.

Syd. l. cit., on *Phœnix,* Mudigere, Mysore; Chittagong; Burdwan, Bengal; Hunsur, Mysore; Ramachendrapur, Godavari.—Syn.: *M. contigua* K. et R.; known from Florida and Tonkin.

2.—Microthyriales.

Asterina pemphidioides, Cke. Grevill. V, p. 16.

Syn.: *Ast. crustosa* B. et Cke.

Ast. Fumago (Niessl.) v. H.

On leaves (locality unknown): Grev. l. cit; on *Eugenia jambolana,* Godavari (Syd., p. 390), cfr. on this species Theissen, Fragmenta Brasil. No. 109, 201 (Annal. mycol. 1911).

[**Asterina concentrica,** Cke. Grevill. XIV. p. 13.]

On culms of *Saccharum,* N. W. India. Belongs to the Dothideaceæ (cfr. Theissen, Fragm. brasil. No. 90), without fruit and cannot be further considered.

[**Asterina scutellifera,** Berk. Syll. I, p. 50.]

On leaves of *Antidesma,* Chittagong.—Undeveloped, cfr. Theissen l. cit. No. 102.

Asterina congesta, Cke. Grevill. VIII, p. 96.

On leaves of *Santalum album,* Belgaum.

Asterina carbonacea, Cke. Grevill. l. cit.

On coriaceous leaves, Belgaum.

[**Asterina cincta,** Berk. Syll. I, p. 43.]

On leaves of *Camellia,* Khasia.—This undeveloped and wrongly described species is to be replaced by the following:

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Asterina Camelliae, Syd. et Butl. Syd. p. 389.

On *Camellia Thea,* Dunmur Dullung, Sibsagar District, Assam. Cfr. Theissen, Fragm. bras. n. 169.

Asterina Capparidis, S. et B.-Syd. p. 390.

On *Capparis,* Madras.

Asterina incisa, Syd. l. cit.

On *Webera corymbosa,* Balehonnur, Mysore.

Asterina indica, Syd., l. cit.

On *Symplocos,* Darjeeling.

Asterina Lawsoniae, P. H. et Nym Syd. l. cit.

On *Lawsonia alba,* Pusa.

Originally described from Java.

Asterina magnifica, Syd. et Butl. l. cit.

On *Terminalia,* Moulmein, Burma.

Asterina malabarensis, Syd. l. cit.

On *Pothos scandens,* Kanouth, Malabar.

Asterina spissa, Syd., p. 392.

On *Jasminum,* Chittagong.

Asterina Stuhlmanni, P. Henn. Syd. l. cit.

On *Ananassa sativa.*—Original from Africa.

Microthyrium microscopicum, Desm.

Grevill. VIII, p. 96, Belgaum.

Calothyrium aspersum, (Berk.) Theiss.

Syn.: *Asterina aspersa,* Berk. Syll. I, p. 45.

Microthyrium aspersum, (Berk.) v. H.

On leaves of *Laurus,* Khasia. Cfr. Theissen, Zur Revision d. G. Microthyrium No. 17 (Oest. Bot. Zeitschr. 1912).

Seynesia grandis, (Niessl.) Wint. Syll. IX, p. 1064.

On dry culms of *Calamus,* Calcutta.

Vizella conferta, (Cke.) Sacc.

Syn.: *Micropeltis conferta,* Cooke Grevill. VI, p. 118.

On leaves of "Bhauri" (*Symplocos spicata*), Dinagepore.

Myiocopron orbiculare, (Cke.) Sacc.

Syn.: *Micropeltis orbicularis,* Cooke Grevill. VI, p. 118.

On *Symplocos spicata,* Dinagepore.

3.—Hysteriineæ.

Lembosia caespitosa, (Cooke) Sacc.

Syn.: *Ailographium cæspitosum,* Cke. Grev. VIII, p. 95.

On coriaceous leaves, Belgaum.

Aulographum vagum, Desm. Syll. II, p. 727.

On coriaceous leaves, Himalaya.

Lophodermium Pinastri, (Schrad.) Chev.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Syn., p. 378, on *Pinus excelsa*, Achibal, Kashmir.

Acrospermum parasiticum, Syd. l. c.

On leaves of *Heptapleurum venulosum*, Kumaon, Himalaya.

4.—PLECTASCINEÆ.

Thielavia basicola, Zopf. Syd. l. cit.

On roots of *Viola odorata*, Lahore.

Originally described on roots of Senecio elegans, in the Bot. Gardens Berlin.

5.—DISCOMYCETES.

Helvelia crispa, Fr. Grevill. IX, p. 13 ; Syll. VIII, p. 18.

On the ground, Punjab ; Syd., p. 374, Achibal, Kashmir.

Morchella bohemica, Kromb. Syll. VIII, p. 10.

Grevill. V., p. 16, on the ground, Kashmir. "Eaten by the natives; dried and sent down into the plains." (It seems doubtful, whether the identification was correct; it was, perhaps, the following.

Morchella esculenta, Pers. Syll. viii, p. 8.

Grevill. V., p. 16, on the ground, Kashmir ; Syd., p. 374.

Amritsar ; Ranikhet, Kumaon, Himalaya.

Morchella deliciosa, Fr. Syll. VIII, 10.

Syd., p. 374, on the ground, Amritsar.

Morchella conica, Pers. Syll, VIII, p. 9.

On the ground, Dehra Dun (Theissen, F. Bombay. Ann. mycol. 1911, p. 158) var. *acuminata*, Kickx.

Siwalik Range (P. Henn. F. Ind. Orient. II, Hedwigia 1901, p. 338).

Rhizina reticulata, B. et Br. Syll. VIII, p. 58.

On the ground, Neilgherries.

Rh. zonata, Berk. Syll. VIII, p. 59.

Amongst *Pinus* leaves, Darjeeling.

Peziza epispartia, B. et Br. Syll. VIII, p. 89.

Grevill VIII, p. 96, Belgaum.—Type from Ceylon.

Otidea darjeelensis, Cooke.—Syll. X, p. 4.

Darjeeling, on the ground.

Lachnea geneospora, Berk.—Syll. VIII, p. 178.

On wood ; locality unknown.

Helotium pusense, Syd., p. 374.

On twigs of *Ricinus communis*, Pusa.

Ombrophila indica, Syd., p. 375.

On rotten wood, Dehra Dun.

Pseudopeziza Medicaginis, (Lib.) Sacc.

Syd., p. 375, on leaves of *Medicago sativa*, Poona ; on *Medicago lupulina*, Harwan, Kashmir.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Known from Europe, South America, Siberia.

Pseudopeziza repanda, (Fr.) Karst. Syll. VIII, p. 727.

Syd. l. cit. on leaves of *Galium*, Kasauli.

Known from Europe.

Pseudopeziza trifolii, (Biv. Bernh.) Fuck.—Syll. VIII, p. 723.

Syd. l. cit. on leaves of *Trifolium pratense*, Verinag, Kashmir.

Chlorosplenium ærugineum, (Berk.) Sacc.—Syll. VIII, p. 318.

Syn. : *Peziza ærugínea*, Berk.

On decayed wood, Khasia.

Lachnella nilgherrensis, Cke.—Syll. X, p. 20.

Grevill. XIX, p. 73, in caulibus herbaceis ; locality unknown.

Dasyscypha Emerici, (Berk. et Phil.) Sacc. Syll. X, p. 22.

Grevill. XIX, p. 74, on branches, Neilgherries.

Bulgaria chalybaea, (Berk.) Cke. et Mass. Syll. X, p. 41.

Grevill. XIX, p. 41, on wood, Darjeeling.

Lagerheimia Carteri, (Berk.) Sacc. Syll. X, p. 55.

Syn. : *Patellaria Carteri*, (Berk.) Phil.

Grevill. XIX, p. 75, on dead wood, Bombay.

Aleurina orientalis, (Pat.) Sacc. et Syd.

Syn. : *Phæopezia orientalis*, Pat. Syll. X, p. 24.

Syd., p. 374, on cow dung, Pusa.—Type from Tonkin.

Saccobolus Kerverni (Crouan) Boud.—Syll. VIII, p. 524.

Syd., l. cit., on horse dung, Pusa.—Common European species.

Tryblidiella rufula, (Spreng.) Sacc.

Syd., p. 375, on branches of *Citrus*, Sagaryng, Burma; Pulliyanur, Travancore ; Dehra Dun.—Known also from N. America and Brazil.

Pseudophacidium indicum, Syd., p. 375.

On branches, Dehra Dun.

Phacidium symplocinum, Syd., p. 376.

On living leaves of *Symplocos*, Darjeeling.

Cryptomyces Pongamiae, (B. et Br.) Sacc.

Syd. l. cit. on leaves of *Pongamia glabra*, Islampur, Bombay Presidency.

Schizothyrium annuliforme, Syd., p. 376.

On living leaves of *Acer oblongus*, Mussoorie.

Coccomyces vilis, Syd. et Butl.—Syd., p. 377.

On leaves of *Mangifera indica*, Malda.

Rhytisma conoideum, Cooke. Syll. VIII, p. 761.

Grevill. V, p. 16, on leaves (sterile).

Rhytisma durissimum, Cooke l. cit.

On coriaceous leaves (sterile).

Rhytisma ustulatum, Cooke Grevill. V, p. 17.

On dead leaves (*Ficus* ?).

Rhytisma fuscum, Fr.—Syll. VIII, p. 759.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

On *Sapindacea* (sterile).

The last three species are very doubtful.

Rhytisma acerinum, (Pers.) Fr.

Syd., p. 377, on leaves of *Acer cæsius,* Harwan, Kashmir; Darjeeling.

Rhytisma himalense, Syd. et Butl.—Syd., p. 377.

On leaves of *Ilex* (*dipyrena* ?), Ranikhet, Kumaon, Himalaya.

Rhytisma piceum, Berk.—Syll. VIII, p. 762.

Syn. : *Rhytisma pieridis,* Pat.—Syll. XIV, p. 817, from Tonking.

Tambur Vall, Nepal. Syd., p. 378, on *Pieris,* Ranikhet, Kumaon, Himalaya; on *Pieris ovalifolia,* Nepal.

6.—Dothideales.

Phyllachora demersa, (Corda) Sacc. Syll. II, p. 595.

Syn.: *Sphæria demersa,* Corda.

Dothidea demersa, Corda.

On living leaves (Ixora ?); Grevill. V, p. 16.

Phyliachora annulata, (Cke.) Sacc. Syll. II, p. 610.

Syn.: *Dothidea annulata,* Cooke, Grevill. VIII, p. 95.

On leaves of unknown tree, Belgaum.

"A curious species, with the perithecia forming little rings, but entirely sterile."

Phyllachora Ficuum, Niessl. Syll. II, p. 598.

On leaves of *Ficus infectoria,* Calcutta; Syd., p. 395, on *Ficus mysorensis,* Yelwal, Mysore; on *Ficus mysorensis* var. *pubescens,* Wynaad.

Phyllachora infectoriae, Cke. Bilikere, Mysore; on *Ficus religiosa,* Jessore, Bengal; Syd., p. 396.

Phyllachora aspidea, (Berk.) Sacc. Syll. II, p. 598.

Syn. : *Dothidea aspidea,* Berk. (from Ceylon).

Syd., p. 396, on (*Ficus scandens* ?), Ranikhet, Kumaon, Himalaya.

Phyllachora topographica, Sacc.

Syn.: *Phyllachora marmorata,* Rac. (from Java).

Syd. l. cit., on *Ficus,* Wynaad; on *Ficus hispida,* Chittagong.

Phyllachora abyssinica, P. Henn.

Syd. l. cit. on *Ficus* sp., Assam.—(Type from Abissynia.)

Phyllachora Musae (Kl.) Sacc. Syll. II, p. 613, 625; IX, p. 1023.

Grevill. XIII, p. 64, on *Musa.*

Phyllachora repens, (Corda) Sacc. Syll. II, p. 598.

Syn.: *Dothidea repens,* Corda.

Grevill. V, p. 16, on *Ficus gossypina*; VIII, p. 95, on *Ficus religiosa,* Belgaum; Syd., p. 396, on *Ficus religiosa,* Madras.

Phyllachora rhytismoides, (Corda) Sacc. Syll. II, p. 595.

Syn. : *Dothidea rhytismoides,* Corda.

On *Acacia* sp., Tenasserim.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Phyllachora Chionachnes, Syd.—Syll. XVII, p. 839.

On living leaves of *Chionachne barbata,* Panjab.

Phyllachora viventis, (Cke.) Sacc. Syll. II, p. 601.

Syn.: *Dothidea viventis,* Cooke. Grevill. V., p. 16.

On living leaves of *Leguminosæ.*

Phyllachora Dalbergiae, Niessl—Syll. II, p. 595.

Syd., p. 397, on *Dalbergia Sissoo,* Pusa; on *Dalbergia* sp., Bilin, Burma. —Type from Calcutta.

All the following Phyllachora-species are mentioned by Sydow, p. 397, sqq.

Phyllachora Pongamiae, P. Henn.

On *Pongamia glabra,* Madras.

Phyllachora Desmodii, P. Henn.

On *Desmodium* sp., Harwan, Kashmir.

Phyllachora? tenuis, (Berk.) Sacc.

On *Bauhinia vahlii,* Kirkee, Bombay Presidency.—Type from Nicaragua.

Phyllachora? fimbristylicola, Speg.

On *Fimbristylis* sp., Dauracherra, Assam; on *F. dichotoma.*—Kanaighat Assam.

Phyllachora Coicis, P. Henn.

On *Coix lacryma Jobi,* Wynaad, Malabar.

Phyllachora Cynodontis, (Sacc.) Niessl.

On *Cynodon Dactylon,* Bankipore.—Very common.

Phyllachora Cyperi, Rehm var. **Donacis,** Berl. et F. Sacc.

On *Arundo,* Wahjain, Assam; on *Imperata arundinacea,* Khasi Hills, Assam; on *Andropogon muricatus,* Pusa; on *Saccharum spontaneum,* Pusa.

Phyllachora graminis, (Pers.) Fuck.

On *Isachne,* Kaneighat, Sylhet, Assam; on *Panicum,* Panora, Wynaad; on *Andropogon assimilis,* Kumaon, Himalaya and Dehra Dun; on *Andropogon micranthus,* Maymyo, Burma; on *Anthistiria,* Wynaad; on *Pogonatherum saccharoideum,* Kumaon, Himalaya; on *Pallinia grata,* Moulmein, Burma; on *Oryzopsis,* Wynaad; *Panicum* sp., Wahjain; *Ischæmum laxum,* Bilin, Burma; *Panicum colonum,* Champaran, Bengal; *Centotheca lappacea,* Moulmein, Burma; *Andropogon* sp., Roppa, Mysore.

Phyllachora Bischofiae, Syd.

On *Bischofia javanica,* Panora, Wynaad.

Phyllachora dolichospora, Syd.

On *Tinospora cordifolia,* Solebile, Mysore.

Phyllachora erebia, Syd.

On *Caragana* sp., Harwan, Kashmir.

Phyllachora permixta, Syd.

On *Schima wallichii,* Maymyo, Burma.

Phyllachora transiens, Syd.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

On *Eurya acuminata*, Kumaon, Himalaya.

Phyllachora spissa, Syd.

On *Dalbergia sissoo*, Wynaad.

Phyllachora malabarensis, Syd. et Butl.

On *Bambusa*, Wynaad, Malabar.

Phyllachora Shiraiana, Syd.

On *Arundinaria*, Wahjain, Assam.

Phyllachora Rottboelliae, Syd. et Butl.

On *Rottboellia exaltata*. The Droog, Nilgiri Hills.

Ophiodothis vorax, (B. et C.) Sacc. Syll. II, p. 652.

Syn.: *Dothidea vorax*, B. et C.—On *Carex*, Khasia.

Ophiodothis sclerotica, (Pat.) P. Henn. Syll. XVI, p. 633.

Syn.: *Epichloe sclerotica*, Pat. Syll. IX, p. 1002 (from Tonkin).

On the inflorescence of *Andropogon nardus*, Erramacola, Wynaad; *A. Schœnanthus*, Vayitri, Wynaad; *A. sp. sp.*, Chatrapur, Ganjam; Belgaum.

Metachora Bambusæ, Syd. et Butl.

On *Bambusa*, Kanouth, Malabar.

Bagnisiella Tamaricis, (Cke.) Sacc. Syll. II, p. 590.

Syn.: *Dothidea Tamaricis*, Cooke. Grevill. XI, p. 108.

Syd., p. 401, on *Tamarix gallica*, Pusa.—Type from N. America.

Dothidella bambusicola, Syd. et Butl.—Syd., p. 401.

On *Bambusa*, Moulmein, Burma.

Dothidella dispar., Syd. l. cit.

On *Andropogon contortus*, Tellicherry, Malabar.

Scirrhia seriata, Syd. et Butl.—Syd., p. 402.

On *Bambusa*, Moulmein, Burma.

? **Dothidea Terminaliæ,** Syd., p. 401.

On *Terminalia catappa*, Wynaad.

Apiospora camptospora, Penz. et Sacc.—Syll. XIV, p. 534.

On *Saccharum officinarum*, Bilin, Burma (Syd., p. 402)—Type from Java.

Apiospora Montagnei, Sacc. Syll. I, p. 539.

Syn.: *Sphæria apiospora*, Dur. et Mont.

Hypopteris apiospora, (Mont.) Berk.

On *Bambusa*, Nangki; Syd., p. 402, on *Bambusa*, Wynaad.—Known from Europe, Algeria, N. America.

7.—HYPOCREALES.

Polystigma ochraceum, (Wahlb.) Sacc. Syll. II, p. 458.

Syn.: *Polystigma fulvum*, DC.

Sphæria ochracea, Wahlb.

Cited in Grevill. VI, p. 117, on leaves of *Prunus Padus*, Jubal State, N. W. Himalaya (18,000 feet).—Species known from Europe.

Nectria collabens, Berk. et Cke. Syll. IX, p. 958.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Grevill. XII, p. 81, on bark, Bombay.

Nectria alutacea, B. et Cke. Grevill. XII, p. 81 Syll. l. cit.

On bark, Neilgherries.—The species belongs to the group of *N. ochroleuca* (Schw.) Berk.—Cfr. on this and other species of *Nectria*; Weese and v. Höhnel "Zur Synonymie der Nectriaceen" in Annal. myc. fasc. 4, 1910 and 1911.—*N. ochroleuca* is a widely spread species.

Nectria lætifulva, B. et Cke. Grevill. XII, p. 82; Syll. IX, p. 961.

On bark, Neilgherries.

Nectria xanthostigma, B. et Cke. ll. cit.

On herbaceous stems, Neilgherries.

Nectria bolbophylli, P. Henn. Syll. XVII, p. 790.

Syd., p. 392, on stems of *Cajanum indicum*, Dehra Dun; on bark of *Piper niger*, Vayitri, Wynaad; on *Piper betle*, Shiggaon, Bombay Presidency; on *Cocos nucifera*, Pulliyanur, Travancore; on culms of *Oryza sativa*, Chittagong.

This widely spread species shows numerous forms, such as *N. Citri*, P. Henn.; *calonectricola*, P. H.; *citricola*, P. H.; *Victoriæ*, P. H.; *luteococcinea*, v. Höhn.; *bogoriensis*, P. H., *asperata*, Rehm; *Melanommatis*, Syd. a. o.

Nectria cinnabarina, (Tode) Fr. Syll. II, p. 479.

Syn.: *N. ochracea* (Grev.) Fr. Syll. II, p. 487.

Syd., p. 393, on branches of *Populus ciliata*, Verinag, Kashmir; of *Prunus armeniaca*, Achibal, Kashmir.—The species occurs also in Europe, Ceylon, Siberia, N. America and Brazil.

Nectria subcoccinea, Sacc. et Ell. Syll. II, p. 482.

Syn.: *N. Colletiæ*, Rehm. Syll. XVI, p. 578,
N. coccidophtora, Zim. Syll. XVII, p. 784.

Syd., p. 393, on *Piper niger*, Wynaad.—The species occurs in N. America, Brazil and Java.

Nectria diversispora, Petch. Syd. l. cit.

On *Hevea brasiliensis*, Mergui, Burma.—Type from Ceylon.

Nectria heterosperma, K. et Cke. Syll. II, p. 485.

Syd., l. cit., on dead branches, Dehra Dun.—Type from South Africa.

Nectria tjibodensis, Penz. et. Sacc. Syll. XIV, p. 636.

Syn.: *N. bogoriensis*, P. H.; *ochracea*, P. H.; *Iriarteæ*, P. H.; *flocculenta* P. H. et Nym.

Syd. l. cit., on stems of *Guazuma tomentosa*, Pusa.—Known also from Java and Brazil.

Melanospora parasitica, Tul. Syll. II., p. 464.

Syd., p. 392, on *Cephalosporium Lecanii*, on leaves of *Coffea arabica*, Mysore.—European species.

Melanospora Zamiæ, Corda, Syll. II, p. 463.

Syd. l. cit., on culms of *Oryza sativa*, Noakhali.—Known from Europe and Australia.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Hypomyces chrysospermus, Tul. Syll. II, p. 467.

Syd., p. 394, on *Boletus* (?), Khasi Hills, Assam—European species.

Sphærostilbe gracilipes, Tul. Syll. II, p. 513.

Syd. l. cit., on dead branches, Pulliyanur, Travancore.—Known from Cuba and Ceylon.

Hypocrea flavo-virens, Berk. Syll. IX, p. 976.

Grevill. XII, p. 100, on bark, Neilgherries.

Hypocrea grossa, Berk. Syll. II, p. 528.

On wood—Locality unknown.

Hypocrea subrufa, Berk. Syll. IX, p. 972.

Grevill XII, p. 79, on branches, Neilgherries.

Hypocrea rugulosa, Berk. et Cooke Syll. IX, p. 973.

Grevill XII, p. 79, on rotten wood, Neilgherries; var. *maior* ibidem, on bark of trees.

Hypocrea undulata, B. et Cke. Grevill. XII, p. 79.

Syn.: *Hypocreopsis undulata* (B. et Cke.) Sacc. Syll. IX, p. 981.

On rotten wood, Neilgherries.

Hypocrea Nilgherrensis, B. et Cke. Syll. IX, p. 979.

Grevill. XII, p. 79, on bark, Neilgherries.

Hypocrea Carteri, B. et. Cke. Grevill. XII, p. 79.

Syn.: *Hypocreopsis Carteri* (B. et Cke.) Sacc. Syll. IX, p. 981.

On bark, Bombay.

Pleogibberella calamia, (Cooke) Berl. et V. Syll. IX, p. 992.

Syn.: *Gibberella calamia,* Cooke.

On *Calamus fasciculatus*; locality unknown.

Balansia andropogonis, Syd., p. 395.

On the inflorescence of *Andropogon aciculatus,* Forbesganj, Purnea, Bengal.

Cordyceps Ridleyi, Mass. Syll. XVI, p. 611.

On ant, Selangor.

Cordyceps falcata, Berk. Syll. II, p. 575.

On larvas; locality unknown.

Cordyceps racemosa, Berk. Syll. II, p. 576.

On larvas; locality unknown.

Epichloe cinerea, B. et Br. Syll. II, p. 579.

Syd., p. 394, on the inflorescence of *Eragrostis tenuifolia,* Hunsur and Bilikere, Mysore—Type from Ceylon.

Epichlœ Bambusae Pat., Syll, XIV, p. 655.

Syd., p. 395, on culms of *Bambusa,* South India.—Type from Java.

Hypocrella semiamplexa, (Berk.) Sacc. Syll. II, p. 581.

On *Bambusa*; locality unknown.

Hypocrella Panici, Mass. Syll. XVI, p. 603.

On culms of *Panicum,* Selangor.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Endothia hypocreoides, (B. et Cke.) v. Höhn.

Syn.: *Nectria hypocreoides,* B. et Cooke, Grevill. XII, p. 81.

Syll. IX, p. 958, on bark, Bombay.—Cfr. Weese et v. Höhn. in Ann. mycol. 1910, p. 466.

Neocosmospora vasinfecta, Smith. Syll. XVI, p. 562.

Syd., p. 394, on roots of *Cajanum indicum, Crotalaria juncea, Indigofera arrecta, Cicer arietinum,* Pusa.—Type from North America.

On the morphology of this species and its saprophytic nature in East India Cfr. E. J. Butler. "The wilt disease of pigeon pea and the parasitism of *Neoc. vasinfecta* (Mem. Dept. of Agric. in India, Botan. Series II, No. 9, Jan. 1910).—This species was also observed in India, on *Vigna Catjang, Cyamopsis psoraloides,* some cultivated *Gossypium*-species and *Indigofera sumatrana.*" (Syd. l. cit.)

8.—MYRIANGALES.

Myriangium Durieui, Mtg. et Berk.

Syd., p. 395, on bark, Pusa.

9.—SPHÆRIALES.

Apiospora Montagnei (Pass.) Sacc. Syll. I, p. 539.

On *Bambusa,* Nangki.

Læstadia Theæ, Rac.

?Syn.: *L. Camelliæ* (Cke.), Berl. et V.

Syd., p. 406, on leaves of *Camellia Thea,* Dooars, Bengal.—Type from Java.

Læstadia perusia (B. et Br.), Sacc. Syll. I, p. 430.

Syd. l. cit., on leaves of *Dioscorea,* Chittagong.—Type from Ceylon.

Sphærella Bhauria, Cooke-Syll. I, p. 489.

Grevill. VI, p. 118, on leaves of "Bhauri" (*Symplocos spicata*), Dinagepore.

Physalospora Bambusæ (Rabh.), Sacc. Syll. I, p. 496.

Syn.: *Sphæria Bambusæ,* Rabh.

On leaves of *Bambusa spinosa,* Calcutta Bot. Garden.

Physalospora Calami, Syd., p. 407.

On *Calamus tenuis,* Chittagong.

Physalospora transversalis, Syd., p. 407.

On leaves of *Cocos nucifera,* Bilin, Burma.

Physalospora ventricosa (Dur. et Mtg.), Cke. Syll. XI, p. 292.

Syd., p. 408, on dead twigs of *Ricinus communis,* Pusa.—Type from North Africa.

Physalospora xanthocephala, Syd., p. 408.

On branches of *Cajanum indicum,* Pusa.

Anthostomella Pandani (Rabh.), Sacc. Syll. I, p. 292.

Syn.: *Sphæria Pandani,* Rabh.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

On leaves of *Pandanus furcatus*, Calcutta.

Anthostomella Bambusæ (Lév.), Sacc. Syll. I, p. 289.

Syn. *Sphæria Bambusæ* Lév.

Hypopteris Bambusæ Berk.

On culms of *Bambusa arundinacea*, Nangki.

Metasphæria Boehmeriæ (Rabh.), Sacc. Syll. II, p. 156.

Syn.: *Sphaerella Bœhmeriæ*, Rabh.

On dry stems of *Bœhmeria nivea*, Calcutta.

[illegible]sphæria celastrina, Syd. et Butl., p. 408.

On dead branches of *Celastrus*, Pusa.

Paranthostomella Capparidis, Syd. et Butl., p. 408.

On leaves of *Capparis spinosa*, var. *cucophylla*, Pusa.

Leptosphæria Agaves, Syd. et Butl., p. 409.

On leaves of *Agave rigida*, var. *Sisalana*, Douracherra, Assam.

Leptosphæria Eriobotryæ, Syd. et Butl., p. 409.

On leaves of *Eriobotrya japonica*, Saharanpur.

Leptosphæria indica, Syd. et Butl., p. 409.

On leaves and twigs of *Asparagus*, Wynaad.

Leptosphæria Sacchari, v. Breda. Syll. XI, p. 324.

Syd. l. cit., on leaves of *Saccharum officinarum*, Dehra Dun; Bilin, Burma.—Type from Java.

Ophiobolus Cajani, Syd., p. 409.

On dead twigs of *Cajanum indicum*, Pusa.

Ophiobolus Manihotis, Syd., p. 410.

On *Manihot utilissima*, Pulliyanur, Travancore.

Ophiobolus Porphyrogonus, (Tode), Sacc. Syll. II, p. 338.

Syd., p. 410, on stems of *Vigna Catjang*, Pulliyanur, Travancore.—Known from Europe, North and South America.

Pleospora spinarum, Syd., p. 410.

On spines of *Astragalus*, Achibal, Kashmir.

Massarina usambarensis, (P. Henn.) v. Höhn. Fragm. Z. Myk. XII, p. 46.

Syn.: *Holstiella usambarensis*, P. Henn. Syll. XIV, p. 594.

Syd., p. 410, on bark of *Feronia elephantum*, Chittagong.—Type from Africa.

Massaria marginata, Fuck. Syll. II, p. 9.

Syd. l. cit., on twigs of *Rosa*, Harwan, Kashmir.—European species.

Pleomassaria ilicina, Syd. et Butl., p. 411.

On bark of *Ilex* (*dipyrena* ?), Ranikhet, Kumaon, Himalaya.

Astrocystis mirabilis, B. et Br. Syll. I, p. 293.

Syd. l. cit., on culms of *Bambusa*, Bulsar, Bombay Presidency.—Type from Ceylon.

Trabutia ambigua Syd., p. 411.

On leaves of *Eugenia Jambolana*, Koppa, Mysore.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Trabutia cayennensis, (D C.), Sacc. Syll. I, p. 449.

Syn. : *Xyloma cayennense,* D C.

Sphæria cayennensis (D C.), Fr.

On *Myrtacea* ; locality unknown.—Type from South America.

Sphæria constellatio, Berk. Syll. II, p. 398.

On leaves, Khasia.

Trichosphæria macularis, Syd. et Butl., p. 402.

On leaves, Pulliyanur, Travancore.

Melanomma citricola, Syd. et Butl., p. 405.

On bark of *Citrus medica,* Chittagong.

Melanomma glumarum, Miyake.

Syd., p. 406, on culms and glumes of *Oryza sativa,* Chittagong.

Rehmiomyces profusus, Syd. et Butl.

On dead branches of *Cajanum indicum,* Dehra Dun.

Boerlagella effusa, Syd. et Butl., p. 403.

On wood and branches of *Populus ciliata,* Mussoorie.

Acanthostigma heterochæta, Syd. et Butl., p. 403.

On living leaves of *Phaseolus Mungi,* var. *radiatus,* Pusa ; on *Dumassia villosa,* Nagpur ; on *Dumassia sp.,* Samalkota.

Rosellinia picta (Berk.), Cooke Grevill, XV, p. 81 ; Syll. IX, p. 496.

Syn. : *Hypoxylon pictum,* Berk.

On decorticated wood, Neilgherries.

Rosellinia andurnensis, Ces. et de N. Syll. I, p. 253.

Syd., p. 404, on dead twigs, Dehra Dun.—European species.

Rosellinia bunodes, (B. et Br.), Sacc. Syll. I, p. 254.

Syd., p. 404, on stumps of *Litsæa angustifolia,* Hassan, Mysore.—Type from Ceylon, known also from Java.

Syd. l. c. : "*Rosellinia bunodes* causes on *Piper nigrum* in Mysore and other trees (*Litsæa Wightiana, Sehleichera trijuga, Holigarna longifolia, Grevillea robusta*) a disease known as 'stump rot' which is fatal to the trees attacked. Massee was the first to draw the attention to this disease of the Black Pepper (Kew Bull. 1895, p. 178), but did not identify it. It has been figured by Penzig and Sacc. in Ic. F. Jav. t. IV, f. 4, and described by Petch in 'Revisions of Ceylon Fungi' II, p. 434."

Rosellinia Mangiferæ, Syd., p. 405.

On bark of *Mangifera indica,* Chittagong.

Rosellinia picacea, Mass. Syll. XVI, p. 438.

On dead bark, Bot. Gardens, Singapore.

Rosellinia echinata, Mass. Syll. XVII, p. 597.

On roots of *Ficus dubia,* Bot. Gardens, Singapore.

Amphisphæria Khandalensis, Rehm.

On *Bambusa,* Khandala. Cfr. Theissen, "F. Bombayenses" in Ann. Mycol. 1911, p. 158.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Chætosphærla indica, Niessl: Syll. II, p. 96.

On leaves of *Alangium decapetalum*, Calcutta.

Chætomium indicum, Corda. Syll. I, p. 220.

Grevill. IV, p. 117., on paper, Burma.

Chætomium amphitrichum, Corda, Syll. I, p. 228.

Syd., p. 402, on dead palm-leaves, Tenasserim; on trunks of *Gossypium indicum*, Nagpur.

Cucurbitaria Agaves, Syd. et Butl.

Syd., p. 406, on leaves of Agave, Dehra Dun.

Corynelia clavata (L.), Sacc. Syll. IX, p. 1073.

On *Podocarpus*, Khasia.—Known from Africa, New Zealand, Venezuela. Syll. XVI, p. 650 gives as synonyms *Alboffia oreophila*, Speg. (from Argentina) and *Trullula tropica* (Awd. et Rabh.) Sacc. from Chile.

Corynelia fructicola (Pat.) v. Höhn.

Syn.: *Capnodium fructicolum*, Pat. Syll. IX, p. 441.

Syd., p. 406, on fruits of *Myrsine africana*, Mussoorie.—Type from China.

Valsa nepalensis (Berk.), Sacc. Syll. I, p. 125.

Syn.: *Sphæria nepalensis*, Berk.

On dead branches of *Betula*, East Nepal.

Valsa Corchori, Syd. et Butl., p. 412.

On branches of *Corchorus sp.*, Poona.

Cryptovalsa Rabenhorstii (Nke.), Sacc. Syll. I, p. 190.

Syn.: *Valsa Rabenhorstii*, Nke.

Sphaeria spiculosa, var. *Robiniae*, Rabh.

Syd., p. 412, on cultivated *Morus*, Pusa.—European species.

Cryptovalsa indica, Syd., p. 412.

On corticated branches, Dehra Dun.

Cryptovalsa planiuscula, Syd. et Butl. l. cit.

On dead branches, Pusa.

Allescherina Boehmeriæ, Syd. et Butl., p. 413.

On dead branches of *Bœhmeria nivea*, Pusa.

Allescherina Cajani, Syd. et Butl. l. cit.

On dead branches of *Cajanum indicum*, Pusa.

Eutypella Zizyphi, Syd. et B., p. 413.

On dead branches of *Zizyphus jujuba*, Pusa.

Eutypella Vitis (Schw.), E. et E.—Syd. l. cit.

On wood of *Vitis vinifera*, Poona.—Type from North America.

Peroneutypella ambiens, Syd., p. 414.

On decayed twigs, Dehra Dun.

Peroneutypella indica, Syd. et B., p. 414.

On dead branches of *Dalbergia Sissoo*, Pusa.

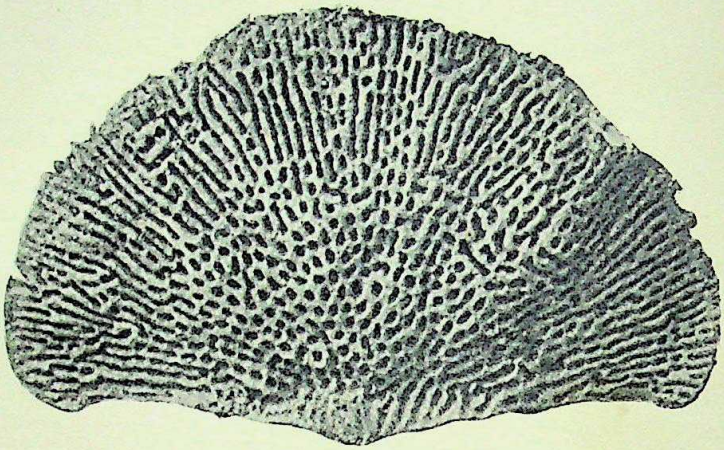
Peroneutypella pusilla, Syd. l. cit.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

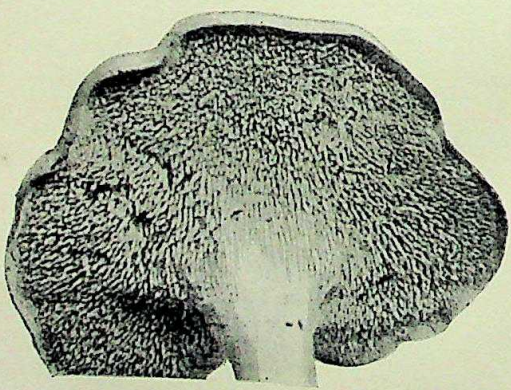
Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

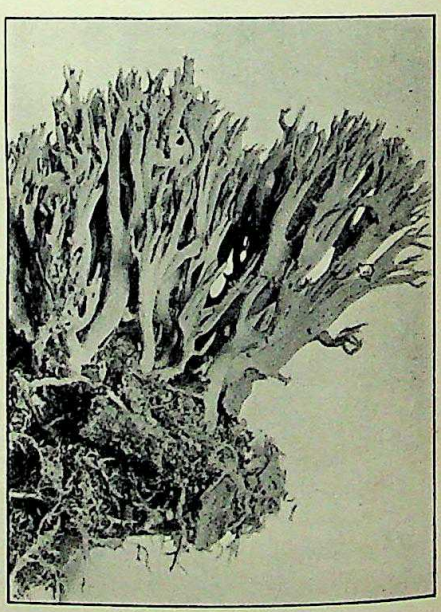
Digitized by Arya Samaj Foundation Chennai and eGangotri



A



B



C

A.— *Lenzites ochroleuca.*

B.—Under Surface of a *Hydnum.*

C.— *Clavaria cinerea.*

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

On dead corticated branches of *Citrus*, Sagaing, Burma.

Anthostoma Carteri (B. et Cke.), Berl. et V. Syll. IX, p. 520.

Syn.: *Fuckelia Carteri*, B. et Cooke Grevill. XII, p. 51.

On bark, Bombay.

Diatrype chlorosarca, B. et Br. Syll. I, p. 195.

Syd., p. 415, on dead culms of *Bambusa*, Tellicherry, Malabar; on branches, Pulliyanur, Travancore; Dehra Dun; Palghat.

Malabar.—Type from Ceylon.

Botryosphæria Agaves (P. Henn.), Butl.

Syn.: *Physalospora Agaves*, P. H. Syll. XVII, p. 585.

Syd., p. 415, on leaves of *Agave*, Pusa.—Type from East Africa.

Botryosphæria egenuia, Syd. et Butl.—Syd. p. 415.

On leaves of *Cymbidium*, Gauhati, Assam.

Hypoxylon ochraceo-fulvum, B. et Cke. Syll. IX, p. 554.

Grevill. XI, p. 133, on bark, Nirwab Jungle.

Hypoxylon deciduum, B. et Br. Syll. I, p. 369.

On palm-leaves, Ceylon, Borneo, India.

Hypoxylon perforatum (Schw.), Fr. Syll. I, p. 375.

On wood, Europe, N. America, Ceylon, India.

Hypoxylon udum (Pers.), Fr. Syll. I, p. 386.

Syn.: *Sphaeria confluens*, Tode.
Sphaeria albicans, Pers.
Sphaeria ordinata, Fr.
Sphaeria lineata, D C.

On wood, Europe, Borneo, India.

Hypoxylon vividum, B. et Br. Syll. I, p. 359.

On bark, Bombay (Theissen, *F. Bombayenses*, Ann. mycol. 1911, p. 159; Syd., p. 417). Type from Ceylon.—Syd., p. 417, on wood, Chittagong Calcutta; Pusa; Surat.

Hypoxylon coccineum, Bull. Syll. I, p. 353.

On wood, Europe, N. America, Australia, Cuba, India.

Hypoxylon multiforme, Fr. Syll. I, p. 363.

On wood, Europe, N. America, Kamtschatka, India.

Hypoxylon Hookeri, Berk. Syll. IX, p. 548.

Grevill. XI, p. 129. On wood, India; locality unknown.

Hypoxylon atropurpureum, Fr. Syll. I, p. 375.

On wood, Europe, N. America, South America, Java, India; Syd., p. 475. On wood of *Tamarindus indica*, Surat.

Hypoxylon fusco-purpureum, (Schw.) Fr. Syll. I, p. 378.

Syd., p. 416, on dead culms of *Bambusa*, Bulsar, Bombay Presidency.—Occurs also in N. America, Cuba and Brazil.

Hypoxylon stygium, (Lév.) Sacc. Syll. I, p. 379

Syd., p. 416, on bark of *Ficus glomerata*, Pusa. I collected specimens

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

with exactly the same characters in Rio Grande do Sul. Type from Guadeloupe.

Hypoxylon rubiginosum, (Pers.), Fr. Syll. I, p. 376.

Syd., 416, on wood, Kasauli; Dehra Dun; on Bambusa, Chittagong; on palm-trunk, Poona; on bark of Dalbergia, Sissoó, Pusa.—This European species was also found in N. America, S. America, Cuba, Ceylon, Java and Algeria.

Hypoxylon indicum, Syd., p. 416.

On branches, Pusa.

Daldinia concentrica, (Bolt.), Ces et D. N. Syll. I, p. 393.

Theissen, F. Bombayenses., p. 159, on trunks, Andheri; Syd., p. 417, on wood, Dehra Dun; Nagpur; Ootacamund, Nilgiris; Bulsar, Bombay Presidency; Cherrapoonji, Assam; Bilin, Burma; Pusa; Darbhanga pr. Pusa; P. Henn., F. Indiæ orient. II (Hedwigia 1901, p. 339), Saharanpur Garden.—Known also from Europe, Siberia, N. and S. America, Ceylon, Borneo, Tasmania, New Zealand.

Daldinia vernicosa, (Schw.), Ces. Syll. I, p. 394.

On wood, Europe, N. America, Algeria, Cuba, India.

Daldinia Gollani, P. Henn. Syll. XVII, p. 617.

P. Henn., F. Indiæ orient. II, p. 339, Siwalik Range, on rotten wood of *Ficus Carica.*

Kretzschmaria Heliscus, (Mont.) Mass. Syll. XVI, p. 449.

Syn.: *Poronia Heliscus,* Mot. Syll. I, p. 349.

On dead bark, Bot. Garden, Singapore.—Type from South America.

Kretzschmaria Kurziana. (Curr.), Cooke Syll. IX, p. 567.

Syn.: *Xylaria Kurziana,* Curr.

Grevill. XII, p. 3, on the ground, Calcutta.

Poronia Oedipus, Mont. Syll. I, p. 349.

Grevill. V, p. 16, on dung; Syd., p. 420, on horse dung, Pusa; known also from N. America, Java, Borneo, Australia.

P. Henn., F. Indiæ orient. II, p. 240, on horse dung, Saharanpur Garden.

Poronia arenaria, Syd., p. 420.

Under *Casuarina* trees, Chatrapur, Madras Presidency.

Poronia polyporoides, P. Henn. Syll. XVII, p. 620.

F. Indiæ orient. II, p. 340, on dead trunks and on the ground, Saharanpur Garden.

Camillea bacillum, Mont., Syll. I, p. 347.

Theissen, F. Bombayenses, p. 159, on bark, Khandala. Type from S. America.

Ustulina maxima. (Hall.) Schröt. Syll. I, p. 351.

Syn.: *Ustulina vulgaris,* Tul.

Hypoxylon ustulatum, Bull.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Sphaeria deusta, Hoffm.

Sphaeria versipellis, Tode.

P. Henn., F. Indiæ orient. II, p. 339, Saharanpur Garden.—Known also from Europe, N. and S. America, Cuba, Ceylon.

Ustulina tessulata, (Berk.) Cooke, Syll. IX, p. 542.

Grevill. XII, p. 3, on wood, Bombay.

Xylaria allantoidea, Berk, Syll. I, p. 314.

Syd., p. 417, on wood, Wahjain, Assam.—Known also from Brazil, Cuba Borneo, Ceylon. P. Hemmings, F. Indiæ orient. II, p. 340 mentions also *Xylaria obtusissima* (Berk.) Sacc. on dead stems, Saharanpur Garden; this species, if correctly determined, is identical with *allantoidea* (cfr. Theissen, Xylariaceæ austro-brasil., Denkschr. Acad., Vienna, 1910, p. 57, and Beit. Bot. Centralbl. 1910, p. 366).

Xylaria regalis, Cooke, Syll. IX, p. 530.

Grevill. XI, p. 86, on wood, Bot. Garden, Calcutta; perhaps merely a form of *X. plebeja* Ces. (cfr. Theissen l. cit., p. 58).

Xylaria plebeja, Ces. Syll. I, p. 318.

Syd. p. 420, on wood, Pusa. *Xylaria fistuca*, Berk.

Syll. I, p. 313, from Nepal is the same species (cfr. Theissen ll. cit.)

Xylaria salmonicoior, Berk, Syll. IX, p. 529.

On wood, Neilgherries.

[**Xylaria furcellata**, Berk, Syll. IX, p. 537.]

Grevill. XI, p. 88, Neilgherries. This species cannot be maintained, because quite undeveloped.

Xylaria dealbata, B. et Br. Syll. I, p. 323.

Theissen, F. Bombayenses, p. 159, Khandala, 4.

Xylaria Thyrsus (Berk). Sacc. Syll. I, p. 320.

On wood, Calcutta.—Known also from Brazil (cfr. Theissen ll. cit.).

Xylaria deserticola, Speg. Syll. XVII, p. 629.

Syd., p. 417, on roots of *Ficus*, Fraserpet, Coorg; on rotten wood, Pusa. Having identified Sydow's specimens myself, I could not find the slightest difference between his from India and my own from Brazil.

Xylaria involuta, Kl. Syll. I, p. 324.

On wood, Kala Panee; Khasia; [Ceylon; S. Amerika; Australia; New Zealand]. This species was described under various names from all tropical regions [*X. Telfairii, gigantea, tabacina, ventricosa*, etc.—cfr. Theissen ll. cit.]

[**Xylaria compuncta**, (Jungh.) Berk. Syll. I, p. 325.]

Reported from Khasia; also from Ceylon, Java. This species probably belongs to the *Hypocreaceas*.

Xylaria Gomphus, Fr. Syll. I, p. 316.

P. Henn. F. Indiæ or. II, p. 340, Saharanpur Garden in a subterranean cellar. Identical with the above mentioned *X. involuta* (cfr. Theissen l. cit.)

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Xylaria Hypoxylon, (L.) Grev. Syll. I, p. 333.

P. Henn. l. cit., Saharanpur Garden; Syd., p. 418, Solebili, Balehonnur and Bargnai, Mysore. The species occurs all over the world (cfr. Theissen ll. cit).

Xylaria aristata, Mont. Syll. I, p. 333.

Grevill. VIII, p. 96, Belgaum—Known also from Central America, South America and Borneo.

Xylaria Delitschii, Auersw. Syll. I, p. 336.

P. Henn. F. Indiæ or. II, p. 340, Saharanpur Garden. It is very doubtful whether the identification of this species, which is only known from Germany, is correct.

Xylaria digitata, (L.) Grev. Syll. I, p. 339.

P. Henn. l. cit. Mussoorie, Arnigadh—Known from Europe, Africa, North and South America, Java, Ceylon.

Xylaria pistillaris, (P. Henn.) Theiss.

Syn.: *Hypoxylon pistillare,* P. Henn. Syll. XVI, p. 446.

Syd., p. 416, on bark, Bargnai, Mysore.

[**Xylaria Carteri,** Berk. Grevill. XI, p. 88.]

Syn.: *Hypoxylon Carteri,* Berk. Syll. IX, p. 545.

On wood, Bombay.—Belongs to *Xylaria obovata,* Berk. (Cfr. Theissen, *Xylariaceæ,* p. 34.)

Xylaria scopiformis, Mont. Syll. 1, p. 340.

Grevill. VIII, p. 96, Belgaum.—This species is only a form of the following:

Xylaria tuberosa (Pers.), Cke. Syll. IX, p. 537.

Syd., p. 420, on rotten wood, Bargnai, Mysore.—Type from the Sandwich Islands. On this species cfr. Theissen, *Xylariaceæ,* p. 8.

[**Xylaria escharoidea** (Berk.), Sacc. Syll. I, p. 316.]

Grevill. VIII, p. 96, Belgaum.—Type from Ceylon. Cfr. *Xylaria nigripes.*

Xylaria Emerici, Berk. Syll. IX, p. 528.

Grevill. XI, p. 86, Neilgherries.

Xylaria trichopoda, Penz. et Sacc. Syll. XVII, p. 633.

Syd., p. 420, Dehra Dun.—Type from Java.

Xylaria excelsa, Syd., p. 418.

On the ground (?), Narsinghpur, Central Provinces.

Xylaria heloidea, Penz. et Sacc.

Syd., p. 418, on branches, capsules and leaves of *Cedrela Toonæ,* Dehra Dun.—Type from Java; known also from Brazil. (Cfr. Theissen, *Xylariaceæ* cit.)

Xylaria euglossa, Fr. Syll. I, p. 324.

Syd., p. 418, on dead wood of *Tamarindus indica,* Surat District, Bombay Presidency; on wood, Botanical Garden, Calcutta.—Type from Costarica; as *Xylaria turgida* from the Nicobar Islands; as *Xylaria*

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

australis from Australia; also common in Brazil. (Cfr. Theissen, *Xylariaceæ*, p. 57.)

Xylaria hypsipoda, Mass. Syll. XVI, p. 442.

On dead leaves, Singapore.

Xylaria Ridleyi, Mass. Syll. XVI, p. 443.

On dead wood, Botanical Garden, Singapore.

Xylaria aspera, Mass. Syll. XVI, p. 444.

On rotten wood, Selangor.

Xylaria nigripes, Kl. Syll. IX, p. 527.

Syd., p. 419, on the ground, Dehra Dun; Koppa, Mysore; Jullundur; Pusa; Dhulia, Bombay Presidency. *Xylaria peperomioides,* P. Henn., reported by Hennings (F. Indiæ Orient. II, p. 340; Syll. XVII, p. 622) from Saharanpur, is the same species (Cfr. Syd. l. cit.); other synonyms are: *Xylaria Gardneri, Xylaria escharoidea,* Berk., *Xylaria piperiformis, Xylaria mutabilis, Xylaria flagelliformis.*—Known from East India, Ceylon, Java, South America.

(To be continued.)

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

MORE BIRD NOTES BY THE WAY IN KASHMIR.

BY

LT.-COL. H. A. F. MAGRATH.

The following notes are supplementary to and in amplification of "Bird Notes by the Way in Kashmir" published in Vol. XXI, No. 2, of this journal. In these latter I expressed the hope of being able to revisit my leave haunts, of last year, in the breeding season. That wish has been partly gratified for I reached Sonemurg this year (1912) during the second week in June. Hopes and anticipations with which I set out to ornithologize on arrival were on the whole, I must confess, not realized, and no startling discoveries fell to my lot.

Sonemurg, with which locality these notes are mainly concerned, lies at an elevation of 9,000 feet and over, is well in the interior of the Himalayan region, and consequently is practically under snow till the middle of May, and it surprised me therefore to find the breeding season already well advanced when I arrived there. Many species had young, well feathered, in the nests, and of some species these were on the wing.

References in these notes are to the above named publication except where otherwise stated.

On the Jhelum Valley cartroad near Dulai at an elevation of barely 2,000 feet I passed a midday, the 29th of August, a flock of young Jackdaws, *C. monedula*, with bills wide agape feeding on the roadway. At this time of year in the narrow gorges, through which the Jhelum flows at this spot, the temperature of the air, owing to the confined space and to radiation from the rocky surroundings, may be anything, from 120 Fahr. and upwards, at midday, and bears comparison with the conditions obtaining at the same season in Dera Ismail Khan or Jacobabad. Yet at this same moment similar flocks of young daws were disporting themselves in the cool breezes of Sonemurg, 150 miles to the north-east. Truly the vagaries of individuals of a species as regards distribution and relative temperatures are wonderful.

The Chough, *Graculus erimeta*, is supposed to derive its name from its note. But the note is much more like the syllables "Chee-o kah" pitched high and squeaky. There is also the common note like "Khew" which has been recorded of this species in England. The young after leaving the nest and when clamouring to be fed make a loud plaintive squeaky mewing note.

The Himalayan Whistling Thrush, *Myiophoneus temmincki*, often utters its loud whistling song when on the wing.

Nests of the Kashmir Wrens, *Anorthura nepalensis*, found at Sonemurg were all built in holes in birch trees, one nearly 10 feet from the ground.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

A large brown Warbler with a long bill seen at Sonemurg on August the 9th among the dwarf elders and rank weedy growth on the flat ground across the Sind river, where it had a concealed brood of fledglings, was (I feel safe in identifying it as such in spite of its resemblance to some of the *Acrocephali*, and especially as a nest of the species was taken in this very spot a few years ago by Colonel K. Buchanan). "The Large-billed Bush Warbler" *Tribura major*. This Warbler when imagining its young in danger clings to the top of a tall plant to survey the intruder, and utters a loud alarm note, which, if a double "r" could be added to the sound, would be exactly reproduced by the knocking together of 2 large pebbles.

The similarity in habits between Pallas' Willow Warbler, *Phylloscopus proregulus*, and the Goldcrest, *Regulus cristatus*, is very marked. Both flutter in the same manner at the ends of fir branchlets when picking insects therefrom. But the Goldcrest perhaps creeps more and hunts less on the wing than the Warbler. From the latter he is, from below, most easily distinguished by his beady black eye set in the plain greyish white expanse of the side of the head and cheek.

Nests of the Sooty Flycatcher, *Hemichelidon sibirica*, in Sonemurg were beautifully neat little structures of moss and cobwebs lined with goats' hair. All were placed *on* branches. Some near the trunk, others well out on the branch. Some were high up near the tops of the trees, others only 20 feet or so from the ground. The Birch, the Sycamore, the Bird Cherry, and the Himalayan Silver Fir all seemed to be equally selected as nesting sites.

The Rufous-tailed Flycatcher, *Alseonax ruficaudus*, has a loud melodious song. Some of the notes indeed are remarkably loud for the size of the bird. The song is not continuous but consists of warbles and whistles interrupted by the bird's flittings to catch a fly, or pick an insect off a leaf, the stem of a tree, or, rarely, from the ground. Some notes closely resemble those of the Indian Blue Chat, *Larvivora brunnea*. A characteristic part of the song may be syllabified as "Tyee-trrirr, trrirr tee." Amongst others notes frequently heard sound like "Weetititew," "Ee-willu willu" and "Choi choi." Occasionally there is a loud finch-like "Twoink twoink". All notes are rapidly repeated. While singing the male rarely stays for more than a few seconds in one spot and as he prefers a leafy tree, for choice the Birch, *Betula utilis*, and is at the best of times not a conspicuous bird, coupled with the exasperatingly ventriloquial character of the song, he is exceedingly hard to pick up and follow by eye. Indeed during the breeding season this Flycatcher but for its loud song may be considered to be of a retiring disposition. The male is a hopeless guide to follow in search for nest and eggs. He wanders over a large area of open forest while singing and at times may be found thus, perhaps 300 or 400 yards from the nest.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Days and hours spent by me in searching for a nest met with no success. I came to the conclusion that this Flycatcher must have been breeding high up in the silver firs, *Abies webbiana,* than which trees none are more difficult to spot the nests of small and inconspicuous birds in. But one day long after I had ceased to devote exclusive attention to these birds, my woodcutter coolie, who had orders to report any nests he found, informed me that he had found one of sorts. Proceeding to the spot I saw a small nest from which the young had evidently flown, situated about 10 feet from the ground in the fork of a branch of a small silver fir in forest. Built of moss and grass, it was deep and cup-shaped, and densely lined with feathers. My knowledge of the birds of the locality combined with a process of elimination and, above all, reference to a published description of nests of the present species (Stuart Baker, Ibis Vol. VI., No. 22, p. 279) with which it tallied, led me to the conclusion that I had at last, only too late, found what I had so long sought.

As remarked (*ibid*) the Rufous-tailed Flycatcher does not make sallies from a selected perch when capturing its prey, but flits from branch to branch. In disposition it is pregnacious, chasing away other small birds that come near it. Especially intolerant does it seem of the Himalayan tree-creeper, *Certhia himalayana.* It was not numerous in Sonemurg and pairs did not breed near each other as in the case of *H. sibirica.*

Like Mr. S. L. Whymper I too found a tree nest of the Plumbeous Redstart, *Rhyacornis fuliginosis.* This was over 20 feet up, and built in a crevice in the stem of a silver fir.

The Red-flanked Bush Robin, *Ianthia rufilata,* is to the nest hunter in these forests what the Ruddy Sheldrake is to the Duck Shooter on our Indian Rivers, namely, an unmitigated nuisance, for its loud harsh scolding or alarm note puts every little bird within 100 yards radius on the *qui-vive* and all come to see the trouble and take warning accordingly.

In different localities songs of males of the same species differ, and often to a considerable extent. For instance up the Sind Valley, at about 7,000 feet, the song of Tickell's Ouzel, *Merula unicolor,* which, in the Kashmir Vale below, is a monotonous repetition of a few notes, was here much more varied and melodious. So much was this the case that on occasions I was led to stalk a singing Thrush not recognising it from the song. In every case it proved to be of the present species.

The low pitched musical call note "Tew" followed by a quickly repeated "Tewtya" is quite characteristic of "The Orange Bullfinch," *Phyrulla aurantiaca,* and will, even midst a variety of forest sounds, always indicate the presence of this bird. By imitating the note it is not difficult to bring the bird into one's immediate presence. I used often to call a male into a tree by my tent, where he would sit and sing lustily, and I once called him down on to my tent ropes. The song as mentioned (*ibid*) sounds "metallic," but

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

it may be still better described as consisting of a series of very rapidly repeated low flute like notes. No two males sing quite alike, although the pitch or tone is the same in every case. For my own edification I syllabified many variations of the song, and so well acquainted did I become with pairs of these birds that I was able to differentiate between them on hearing the male sing. The impression received from the song of the male, mentioned above, when not heard too close, may be well conveyed to the ear by a rapid repetition of the words "Give the devil his due"—"Divil a bit."—This uncharitable sentiment, let us hope, was not really endorsed by the bird!

The staple food in summer appears to be buds and catkins of the Himalayan Birch (ibid), but early in the season it was not uncommon to see pairs hopping about on snow patches in forest picking up minute seeds left on the surface of the melting snow. A curious feeding habit late in summer was the pecking and swallowing of mouthfuls of a very fine grained dry yellow clay which filled in the archways of the roots and the hollow bases of individual old silver Fir trees. Within four yards of me I watched a pair gorge themselves on this stuff for fully ten minutes and then fly away down hill to where I suspected there was a nest but which I never found. If such there was then this nesting was well below 9,000 feet. The clay in question probably contained food properties essential to the young which were doubtless fed on it by regurgitation. A rough analysis however failed to reveal any seeds, insects, or grit and to the taste it was insipid.

I spent many days in forest and on hill side at various elevations searching for the nest. Colonel Ward's description of the locality in which his collectors took these puzzled me considerably for it was only between 9,000 and 10,000 feet, rarely over, that I could be sure of meeting with this species. Above 10,500 feet there was never a sign of the birds. They were in fact left below. This was my experience both in the Liddar and Sind valleys (ibid). I have little hesitation therefore in asserting that 11,000 feet is the maximum elevation at which the Orange Bullfinch will be found in Kashmir. A very short acquaintance too with its habits suffices to shew that like its European congener it is a woodland species. Searching for nests therefore on open bush clad hillsides at 12,000 feet and over which is above the tree limit in these parts, was anything but profitable and I soon abandoned it to confine my attentions to the forests below frequented by the birds. My reward eventually followed in the discovery of a nest on 28th July.

On the 27th I observed a pair of Bullfinches in a strip of forest at a spot just about 10,000 feet above sea level. The action of the female clearly indicated that she contemplated domesticity. But after hopping about in the lower branches of a silver fir and occasionally giving a half-hearted tug at a twig or piece of lichen she and her mate, to my chagrin at the time, disappeared into the forest, and although the notes sounded at intervals did

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

not return to the spot. Determining to watch the place, however, I returned there next day and was gratified on arrival to see the flash of two white rumps as a pair of Bullfinches startled from the ground simultaneously disappeared into a thick tree. A few moments and they were back again, and to my delight the female picked up a twig and flew behind the trunks of some silver firs. Shifting my position, so as to watch the direction of her flight, I saw her return, pick up another twig, and dive with it into a low, tangled, and drooping branch of a medium sized silver fir. For some time I watched through glasses the process of building. Twigs were the only material used during my vigil. It was interesting to watch the manœuvres to get an extra long one into position. This would be first pushed into the branch by one end while she, going round to the nest side, would from there pull it through and deftly weave it into place. Not

The cross marks site of nest of Orange Bullfinch (*P. Aurantiaca*)—nest about 6 feet from ground.

daring to go nearer for fear of disturbing the pair I left the spot quietly, deciding to return a week later when I hoped the full clutch would be laid.

On the 4th of August, accompanied by Colonel K. Buchanan, I revisited the spot. We found the female on the nest and sitting very close. Three people walking about immediately below did not disturb her and it was not till I almost had my hand on her that she flew off. My astonishment was considerable therefore on examining the nest to find only one egg and that fresh! The situation was puzzling but on Buchanan's advice the nest was left till the 8th August. On arrival at the nest on this date the female was not "on" but appeared a moment or two later with the male and at once flew to the nest. She sat for half an hour or more when the male, returning, called her off. Being satisfied that she was sitting in earnest this time I took the nest and the 3 eggs which it

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

contained. While removing these both birds reappeared close above me uttering the 'tewtya' note.

The eggs were blunt ovals measuring about ·75×·56 and in other respects were more or less similar to those described by Colonel Ward, mine being white fairly densely speckled with reddish brown with superimposed purplish brown spots in a zone round the larger end. The shells were somewhat fragile, smooth, and fine grained in texture.

The nest though smaller was not unlike that of 'The European Bullfinch.' A platform of twigs on which was built a shallow cup of fine rootlets and a little dried grass. A few goat hairs completed the lining.

The close sitting of the female on the 4th August was decidedly strange. She could hardly have been incubating, for although some birds are known to commence this from the laying of the first egg, notably species that lay early in the year and in exposed situations, the Bullfinches are not of this group. I can recall too the fact that on this date she was not sitting down into the nest as she was on 8th August when only the top of her head was visible to one standing by it. The only explanation of her behaviour on the 4th that occurs to me is that she was in the act of laying as we arrived. This was about 8-30 a.m. As she was not kept more than quarter of an hour off the nest on this occasion I am inclined to be sanguine that she had time to get back to lay her egg and did not drop it outside in her extremity.

August nests must, I imagine, be second broods. From the second week in June, when I first met with these Bullfinches, they were always in pairs and the males singing vigorously. Moreover in the beginning of August I came across parties of 3 or more. One party was for certain a pair with 1 young. This latter had been out of the nest for some time as it was exactly like the female and the male kept hunting it away when it persisted in following him. It was not till June the 28th that I first saw signs of nesting when I observed a female with a twig in her bill, but as she flew far away with it I never succeeded in locating the nest.

Like the European Bullfinch, this species is secretive at nesting time only, choosing for the nesting site the quietest and remotest corner of a wood within the limits of elevations given. As far as I could gather the densest portion is not selected, but parts more or less on the level are preferred.

The Orange Bullfinch is a charming little bird in every way. The affection with which the male treats his partner is quite pretty to watch. Rarely does he let her out of his sight, and while she feeds, drinks, or bathes he is never more than a yard or two away seemingly too utterly absorbed in admiration of her charms, to follow suit, and constantly bursting into his melodious little song. While *she* builds the nest *he* sits on a twig close by, now and again looking to see how the work is progressing,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

though never, I fear helping, and occasionally hopping up to give her a kiss by way of encouragement.

That these Bullfinches pair for life is I imagine more than probable.

The Rose Finch, *Carpodacus erythrinus*, was fairly numerous in Sonemurg up to the beginning of July. It doubtless nested there, and at no great elevation either.

I must qualify the statement (ibid) regarding the partiality of the Red browed Finch, *Callacanthis burtoni*, for dark forest situations. This is only partly correct. Although essentially a woodland species and, when actually nesting, a forest bird, yet when the young are fledged, it often ventures into open situations, though never away from the vicinity of trees. Much of its time is spent in searching for food on the ground. It is a wonderfully tame species and often in the early morning a family party would peck for food round the door of one's tent.

Contrary to the impression received last year I find these birds to be early breeders. Fully fledged young were on the wing by the 3rd week in June if not before. The young have the head uniform brown and show no coloured brow or supercilium. There is little doubt that two broods are usual, though I failed to observe a nest.

The common note of this species (ibid) may perhaps on a close acquaintanceship, be better rendered by the syllable 'Pweee'*. This is often followed by notes like 'Pweu' 'Pweueu' or 'Chipeweu'. The 'eu' pronounced as in the French. All notes are plaintive and melodious.

The Himalayan Goldfinch (*Carduelis caniceps*) nested commonly in isolated fir trees about the "Murg" and young were fully fledged by the third week in July. The young have the head uniform grey brown, the red and black mask of the adult probably not being assumed till after the autumn moult. It was a pretty and familiar sight to see flock of "Goldies" flying about the "Murg" fluttering at the thistle and dandelion heads. But only a short time do they stay at the nesting elevation, and by the end of July most have left for the lower valleys. The notes do not differ from those of the European Goldfinch.

---

* It might be imagined that the conformation of a bird's vocal organs, *viz.*, syrinx, palate and bill, would preclude the possibility of its producing any sound commencing with the letter 'P' as made by human lips, but it is remarkable how often bird's notes can only be correctly reproduced by syllables commencing with this letter. As regards the present species this is very much the case. I have listened to the notes at a distance of 3 yards only and no other initial letter in the syllable could so well convey the sound to the human ear. It may be that in the vocal apparatus of some birds an action, analogous to that of human lips when pronouncing the letter 'P' takes place when air, in giving utterance to a note, is expelled through the syrinx, the contiguous surfaces of the back of the tongue and the soft parts of the palate taking the place of lips.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

On the 10th of June at Gund, 14 miles below Sonemarg in the Sind Valley, I saw large flocks of Gold-fronted Finches (*Metaponia pusilla*) on the open hillsides. This finch, like "Stoliczkas," seems to keep in flocks throughout the breeding season. The call-note is a twice quickly-repeated note like 'chup'. It did not occur in Sonemarg.

The 39 miles of cart road running through the rice fields of the Vale of Kashmir from Baramulla to Srinagar is bordered on either hand by a monotonous row of tall poplars planted close together. In the breeding season every third or fourth poplar holds a nest (bulky, untidy structures of grass), some hold four or more. These are nests of the migratory sparrow (*Passer domesticus*) mentioned (*ibid*). The number of nests along this stretch must run nto thousands. But this is only a very small portion of the breeding area of this sparrow in Kashmir. The origin of the vast hordes of sparrows, which descend upon the cornfields of North-West India during the spring passage and hurry through to Central India in autumn, is thus partly revealed. If not a blessing in disguise to the Kashmiri zemindar (as it is a curse and curse only to the farmer of the plains of North-West India) this sparrow at any rate compensates him for any damage done to the rice crops later in the summer by the prodigious quantities of green caterpillars which it destroys to supply the needs of the young in the nest.

Breeding, as described, along a roadway on which there is a considerable traffic, these birds are afforded protection to a great extent from their natural enemy the Sparrow Hawk (*Accipits nisus*). But they have one enemy which *nests* among them and has no fear of the traffic, namely, the Rufous-backed Shrike (*Lanius erythronotus*). That this shrike takes a heavy toll of the sparrows in the shape of young is pretty certain. Indeed, I believe the Rufous-backed shrike to be somewhat addicted to sparrow fare, as wherever sparrows occur in numbers either nesting or roosting, in this part of India, this shrike is pretty sure to be common. A good illustration of its propensities in this respect was afforded me one November afternoon while standing in the club verandah at Nowshera. Over the porchway was a heavy creeper in which sparrows roosted in numbers. While these were noisily settling down for the night a shrike of the above species darted in, took a sparrow, and flew with it to a small tree a few yards away. The fortunate observers of this incident attracted others to the scene, and the strange spectacle was witnessed of a shrike breaking up and devouring his quarry while perched on a small branch some 6 feet or so above the head of the big drummer of the band of an Indian regiment which was playing at the time on the club lawn. Evidently this particular shrike appreciated music at his meals.

Nesting colonies of the above migratory race of *P. domesticus* also occur in Peshawar. In remote corners of this district away from villages n

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

small jungles and rukhs I have found tamarind thorn trees full of such nests.

A curious instance of a double nest was that of an Eastern Meadow Bunting (*Emberiza strachei*) which had built, under a stone, two nests along side of one another. One of these was empty, the other contained four young.

The Crested Bunting (*Emberiza melanicterus*) was quite common on the Murree-Srinagar tonga road between Dulai and Uri. The bird was often to be seen singing perched on the telegraph wires.

In company with a few Snow Pigeons (*Columba leuconyx*) which had their nests in holes in the limestone rocks of the famous pilgrims cave of Amarnath (13,000 feet) was a small colony of Kashmir House Martins (*Chelidon kashmiriensis.*) A further instance of the desolate wild and

AMARNATH VALLEY (13,000), where the famous pilgrims cave is and in which the Kashmir Martin *(C. kashmirensis)* was found breeding. The bottom of the valley is all snow. Taken Aug. 16.

elevated regions to which these Martins resort for breeding purposes in some parts of their range.

On the 30th June a friend, when descending a hill above Sonemarg, disturbed a bird nesting on the ground at about 11,000 feet. The nest contained four eggs which he described as dull whitish in colour and fairly densely speckled with brownish purple. Two days later we visited the spot together and found the eggs hatched and four young in the nest. I watched the female on to the nest and got a close view of her through glasses. From the broad bold streaks on the breast, the comparatively small amount of white visible in the tail in flight and the light flesh coloured legs I

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

feel sure that the bird was the European Tree Pipit (*Anthus trivialis,*) which was so common here last year at the end of August. The nest was in a hollow under a sod on the hillside and was built of dried grasses. It was situated within 20 yards of a small clump of birches into which the parent bird always flew on being disturbed.

A nest of Hodgson's Pipit (*A. rosaceus*) containing four eggs, which I found four days later about 1,500 feet above on the ridge, and under a stone, was composed of exactly similar material.

The Long-billed Horned Lark (*Otocorys longirostris*) when disturbed, rarely takes flight immediately, but runs in front of one with a slight waddling gait which reminds one of a minature chikor. This lark was fairly common on open grassy hilltops at 14,000 feet and over.

The Cuckoo (*Cuculus canorus*) occurred, but was rare, in Sonemarg. The last date on which the call was recorded by me was July the 18th.

I failed to discover—and not for want of searching—the author of a very loud monosyllabic note which was uttered twice comparatively slowly and then three or four times rapidly, the whole being repeated several times with an attempt at rhythm. I first heard it about 14 miles below Sonemarg in the Sind Valley late in the afternoon and again the following morning. At Sonemarg it appeared to be uttered at night only usually between 2 and 4 a.m. My first impression was that it was a note of some Laughing Thursh with which I was unacquainted. But not having met with any birds of this genus, I eventually abandoned this idea and came to the conclusion that the Large Barred Owlet (*Glaucidium cuculoides*) must be the author of the sound. The note could be heard some hundreds of yards away, but was exceedingly difficult to locate.

Scully's Wood Owl (*Syrnium biddulphi*) was the common owl in Sonemarg. Indeed this was the only owl I met with. It was often to be seen perched at the entrance to a large hole in some gnarled old sycamore in forest. Some of these holes, especially those under which I found pellets, were searched, but failed to reveal a nest in being. As I did not come across the bird till after the middle of June the young may have flown, but I have little doubt that it was in such situations they nested.

About an hour before dark this owl wakes up and gives its quadruple cry—a loud "Hoo—Hoot tu whooo," an impressive sound at dusk in these high Himalayan forests. The pause after the first syllable is very marked.

Only occasionally in the breeding season was the 'hoot' given during the actual hours of darkness, but with a waning moon it was often to be heard an hour or so before dawn. Later on in the summer the young owls were often very noisy at night. For some days, whenever an owl, which haunted a bit of wood close to my camp, uttered its note at dusk it was immediately answered by another in a slightly higher key. At times the two hoots would sound simultaneously and whenever this happened the

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

higher-pitched note invariably upset the cadence of the lower, the effect being quite ludicrous. Whether this was a rival, a mate, or a young "Scully" getting his first singing lessons I never discovered. When flying about at night a note repeatedly uttered by these owls sounded like "Khawak."

From an examination of the disgorged pellets it appeared that the principal food in the breeding season consists of small rodents of the *Micromys* and *microtus* genera which abound in these forests. Occasional pellets showed bits of the wing cases (*elytra*) of beetles. I saw no remains of birds. One method of hunting at dusk is as follows:—The owl flits silently to the horizontal trunk of a birch or other tree (at these elevations, 9,000 ft. and over, trees on any slope, owing to the pressure of snow in winter issue horizontally from the soil before they curve up vertically) under which it has marked down the hole of a mouse or vole and there remains motionless. As the little rodent cautiously creeps forth in search of food there is a swift pounce and the owl gets the *entrée* of his supper.

Some writers on Natural History affirm that the "Hoot" of an owl is a hunting cry which they suppose terrifies small birds and mammals into movement so enabling the owl to locate and swoop on them. In the case of the present species the cry, by twilight at any rate, was certainly not used for this purpose for it was generally uttered from the top of a high fir tree on rising ground and repeated often for ten minutes at a time.

Like most members of the family pairs of these owls have their own hunting preserves into which no other individuals of the species are permitted to enter. Three separate patches of forest around Sonemarg each held its own pair of Scully's Wood Owls.

The graceful flight and hover of the Kestrel (*Tinnunculus alaudarius*) was occasionally to be seen over the "Murg." Twice I observed a Kestrel stoop at and give chase to small birds in best approved peregrine style. On the first occasion the quarry was a Grey Wagtail (*Motacilla melanope*) at which constant deadly stoops were made, the wagtail only just escaping by flying into a fir tree. The second instance was the stooping at and chasing of a flock of Stoliczkas Mountain Finches, but in this case it was probably play only.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

PROGRESS OF THE MAMMAL SURVEY.

Since July, when the last editorial note on the progress of the Mammal Survey appeared, work has only been proceeding slowly. This is inevitable in India where, owing to the rainy season prevailing from June to September inclusive, it is almost impossible for field work to continue during these months.

Mr. Crump left Chanda, C. P., in July when the rains set in and returned to Bombay. He is now in Kathiawar and will afterwards probably work Guzerat or Rajputana.

Mr. Shortridge after leaving Shimoga made an expedition to Bellary District where at Humpi (the ancient city of Vijayanagar) he camped and collected vigorously for some weeks. He obtained some 331 specimens there, and the old ruins and temples contained a large number of bats. From Humpi he proceeded to Bangalore and from there to Kolar in the east of Mysore State. He has just left that for Cauvery (Seringapatam) and Mysore after which he goes to Coorg and the West Coast—where the rains will then be over—on his way to the Nilgiris and S. India.

The Committee hope that members residing in districts visited by the Mammal Survey collectors will send in specimens of any animals of which only one or two or no specimens have been obtained by the collectors.

In the Nimar report (p. 844, No. 3, Vol. XXI) it will be seen that very few skins were collected of certain animals and it is most desirable that further specimens should be procured, more especially of the Langur, the Deccan Spiny Mouse and Phillips' Spiny Mouse. Also a considerable number of species, which are almost certain to occur in the district, do not appear in the report as having been obtained by the collector and to make up these deficiencies the Society will be glad to obtain skins and skulls of the Bengal monkey, the smaller bats, flying squirrels, Bandicoot rats, Blanford's rat, porcupine, four-horned antelope, mouse deer, pigs, &c. Though no specimens of the Tree-Shrew (*Tupaia*) were caught either in this district or the Berars (*vide* report, p. 820, No. 3, Vol. XXI) it is in all probability to be found and skins are much wanted. The report on the Dharwar collection appearing in this issue is more complete, but nevertheless as will be seen more specimens of certain kinds are wanted and also of the few which although found in the district were not obtained by Mr. Shortridge.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

As our special collectors can only visit a particular district at one time of the year, it will be obvious that it is almost impossible to obtain specimens of *every* animal found in that district—as at one season some animals will be more difficult to procure than at another season—and it is in this way that our members who are residing in that district can help the Society by filling in the blanks.

Skins and skulls from *all* districts of the different kinds of big game are also much desired, more especially so as our collectors do not try to obtain the larger game animals except when opportunity offers

All skins should be accompanied by their skulls and if possible by the following simple measurements; head and body, tail, hind foot and ear, and a label giving locality, sex and date, should be affixed to both skin and skull *which should only be roughly cleaned.**

Besides specimens we should be glad to receive from members any notes on the distribution, habits, local names and folklore of the different animals in their district. It is hoped that members will co-operate and help with this information so that the Mammal Survey may not only result in a collection of properly labelled and worked out specimens showing the species and their distribution in India, Burma and Ceylon, but also in the bringing together of information of all sorts relating to their habits.

As regards finance, members will be glad to learn that we have received valuable help from the Government of Bombay (Rs. 2,500), the Government of the United Provinces (Rs. 2,000), the Government of India (Rs. 7,500) and Mr. Ratan Tata, a second donation (Rs. 1,000) and the total sum obtained and promised now amounts to Rs. 42,992-8-6 whilst up to date we have spent about Rs. 17,877-11-4.

The Committee feel, however, that a third collector is absolutely necessary if the survey is not to be prolonged for several years. The magnitude of the task is becoming more evident as the survey progresses. India, Burma and Ceylon cover such an enormous amount of ground that if the survey is to be thoroughly done, a third collector to start at the southern boundary of Burma to work northwards is extremely desirable at once. It is estimated that a sum of Rs. 15,000 to Rs. 20,000 will be required to bring out a third collector for 2 years to work Burma. The Government

* A pamphlet on the skinning and measuring of large and small mammals can be had from the Honorary Secretary on application.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

of India have promised Rs. 7,500 as mentioned above and Mr. Ratan Tata has kindly promised another donation of Rs. 1,000 towards this object *on the understanding that the rest of Rs. 7,500 is obtained and the object carried out.* The Committee therefore hope that the balance may speedily be obtained, so that the provision for the other two collectors may not have to be dipped into.

At the same time it will be noticed that the subscription list this time includes very few members' names and it is earnestly hoped that members will not lose their enthusiasm for the scheme in consequence of some Governments having given the Society a helping hand.

Small annual subscriptions towards the Mammal Survey Fund will be very acceptable as the work cannot be carried through thoroughly unless a good deal more money is forthcoming.

MAMMAL FUND.

FURTHER LIST OF SUBSCRIBERS UP TO 30TH SEPTEMBER 1912.

NAME.	Amount.		
	Rs.	A.	P.
Amount previously acknowledged in Journal No. 3, Vol. XXI	27,255	15	0
BOMBAY GOVERNMENT	2,500	0	0
Burke, Capt. H. F.	51	9	6
Evans, Col. G. H.	45	0	0
Fletcher, T. Bainbrigge	50	0	0
Holden, Major H. N.	15	0	0
Howell, E. B.	15	0	0
Milner, C. E.	15	0	0
MADRAS GOVERNMENT	2,500	0	0
O'Donnell, O.	5	0	0
Suter, Dr. M. F. (Rs. 10 per month for June, July, August and September)	40	0	0
UNITED PROVINCES GOVERNMENT	2,000	0	0
Rs. ..	34,492	8	6
For a third Collector.			
Promised by THE GOVERNMENT OF INDIA Rs. 7,500			
" " Mr. Ratan Tata (2nd donation) .. .. " 1,000	8,500	0	0
Total Rs. ..	42,992	8	6

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

MISCELLANEOUS NOTES.

No. I.—TIGER (*FELIS TIGRIS*) KILLING AND EATING ITS YOUNG.

I have often wondered how it is that I have seldom found more than two and never more than three cubs with a tigress although on two occasions when I have been so unfortunate as to shoot a pregnant tigress I have found as many as five unborn cubs inside her. Until a short time ago I accounted for this with the theory that possibly the tigress eats some of her cubs soon after they are born—a habit not unknown with other animals I believe.

Recently however I have come to change my views.

On May 20th I had joined camp with Mr. Symes who was shooting in this district. A tiger, a tigress and two cubs were known to be about and the previous night and in the very early morning the rather unusual roar of a tiger was heard for some time. In the direction of the roars a prepared kill had been taken by a tiger and later about a mile beyond this kill a natural kill of a sambur by a tigress was found. We decided to beat over the artificial kill first. The beat was blank the tiger having gone out of the beat beforehand towards the other kill. The beaters however found two dead half-grown tiger cubs in the beat which had clearly died in the evening before.

We examined these dead cubs and found that they had been killed by a male tiger and both of them partially eaten at the haunch. They had both been killed in the same place but one of them had been dragged some hundred and fifty yards from its dead companion. It was interesting to see that the cubs besides being rather severely bitten in the throat had been much clawed in the arm pits, in fact sufficiently so to alone cause their death.

Local natives, who certainly ought to know something about tigers, say that a male tiger will always kill cubs if he comes across them, and after this interesting experience one can well believe it. In this particular case the tigress had probably left her cubs early in the evening and killed the sambur. While she was busy with this the tiger probably came across the cubs on his way down to the water where the kill was. After disposing of the cubs he must have gone for a drink and killed the bait tied up for him. The roars we heard were probably those of the distressed mother and perhaps it was well that she was not in the beat.

Mr. Symes also corroborates the facts of this story.

JAMES W. BEST, I. F. S.

BILASPUR, C. P., *6th July* 1912.

[In Vol. VII. of our Journal (1892), page 253, we published a note by Colonel Scott of Palanpur, on "Tigers eating their young." —EDS.]

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

No. II.—CANNIBALISM AMONG PANTHERS (*FELIS PARDUS*).

About a week ago I had three panthers, said to be a large male, a female and a small male, marked down in some dense thorn jungle chiefly candelabra cactus and babul not many miles from Veraval.

The jungle was far too close to beat, so I tied up a live goat and sat over it in a machan about 6 P.M. A medium sized male panther came at 6-30 and I hit him hard with a 500 express bullet. He turned and jumped back into cover, and, on examining the spot, I found a piece of lung on a stone, and a thick trail of light-coloured frothy blood leading into the thick thorn jungle. I knew then that he was hit through the lungs and could not go far, so I decided, as the cover was so thick, to leave him till next morning. In the morning I found him lying about 50 yards away the other side of a thick clump of cactus through which he had dragged himself. Imagine my disgust to find that he had been more than half eaten and the skin of course ruined. The head, chest and forelegs, hindlegs, tail and part of the rump were untouched, the rest of him was eaten, the ribs bitten off close to the spine.

All round were the footmarks of the female and the small male, so there is no doubt that they had made a square meal of their dead relation. There were no signs of jackals or hyenas. The dead panther had very large pads, and this accounted for his being described as a large male though as a fact he was only a medium size.

I remember reading of a similar case in a previous note in our Journal, but I believe such cases to be sufficiently rare to make this one worth noting.

J. R. CARTER, MAJOR,
Bombay Political Department.

CAMP VERAVAL,
7th June 1912.

[Cases of this kind have already been recorded both amongst tigers and panthers in Vol VI. and XVII of this Journal.—EDS.]

No. III.—NUMBER OF A PANTHER'S (*FELIS PARDUS*) CAUDAL VERTEBRÆ.

In my notes in the last number of the Journal on Mr. Hick's book "Forty years among the wild animals of India" I referred to his statement that two species of panther are distinguishable, among other differences, by the 'fact' that the large 'species' has only 22 vertebræ in the tail while

CC-0: In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

the smaller has 28. It is of interest therefore to record that in April last in the Mahi Kantha Agency I shot a female panther measuring 6 feet 2 inches (including tail of 2 feet 7 inches) the number of whose caudal vertebræ on careful examination proved to be 24. As a single instance is insufficient to dissipate what I believe to be a myth, it may be hoped that others will be reported by members of the Society.

A. H. MOSSE, CAPTAIN, I.A.

PALANPUR,
23rd July 1912.

No. IV.—NOTES ON MARTENS IN KASHMIR.

Toiling up a moraine one afternoon with a friend at Sonemurg and when at an elevation of about 11,000′ he suddenly gave a low whistle from behind me and beckoned me to his side. There not five yards from us appearing from beneath a rock was a fine example of The Beech Marten (*Martes foina*). The animal did not appear much disquieted by our presence, continuing to sniff and gaze around, till one of us made a slight movement when it withdrew beneath the rocks. We waited some time for its reappearance but it evidently decided to stay at home, or had slipped away by a hidden passage beneath the moraine.

Imagining that we had found the entrance to its lair my friend a few days later set up a camera and waited on the chance of securing a photo, but there was no further sign of the Marten, only a few mouse hares appeared from beneath the same rocks and played about. Later on I went up to try my luck with a gun and to endeavour to secure the Marten as a specimen. But I waited in vain and had to contend myself with a mouse hare which came out *at the same spot as the marten had.* The presence of these mouse hares rather upset the theory that we had discovered the Marten's lair, and we came to the conclusion that, when we saw the latter, it was hunting, and had been prospecting the mouse hare burrows under the rocks from beneath which we saw it emerge. It is hardly likely that a Beech Marten and mouse hares would live amicably side by side. The biblical "Lion and lamb" miracle would be quite eclipsed by such a state of affairs.

In the same locality, the Indian Marten (*M. flavigula*) frequented the forests just below.

H. A. F. MAGRATH, LIEUT.-COLONEL.

KASHMIR, *July* 1912.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

No. V.—NOTES ON THE TIME OF APPEARANCE AND FLIGHT OF EASTERN BATS.*

	Time of appearance.	Flight.
Pteropus	early (well before sunset).	High, slow and heavy (rook-like) occasionally soaring for short distances.
Cynopterus (including all other small fruit bats.)	late (well after sunset).	Low, compared with *Pteropus*, comparatively quick and fluttering.
Rhinolophus	late	Low and fluttering.
Hipposiderus (small).	frequently early.	High, although not particularly swift (Java, New Guinea, etc.)
Megadermatidæ ..	very late ..	Low swift fluttering.
Pipistrellus	early	Larger species swift, smaller species (including *Tylonycteris*) very erratic in flight. The larger species generally fly high, the smaller are variable.

[This is true, but I have several times seen them in swarms before sunset when white ants were swarming after first rain—R. C. W.]

Scotophilus	early ..	.. High, swift.
Harpyiocephalus! (*Hesperotenus ?*)	early ..	.. High, slow and heavy.

[I am not sure of this identification but all specimens entered in lists as *Harpyiocephalus* were *Hesperoptenus*—R. C. W.]

Plecotus	late	Slow and fluttering, comparatively low.
Kerivoula		
Vespertilio		

[Almost certainly Mr. Shortridge means *Myotis*—R. C. W.]

Minopterus	early ..	.. High, very swift.
Emballonura ..	early ..	.. Erratic in flight. Like that of small *Pipistrellus* high (Java, N. Guinea, &c.)
Taphozous	early ..	.. Swift, high.
Rhinopoma	early? ..	.. Swift.
Nyctinomus	early ..	.. High, very swift (Java, Australia, etc.)

G. C. SHORTRIDGE.

August, 1912.

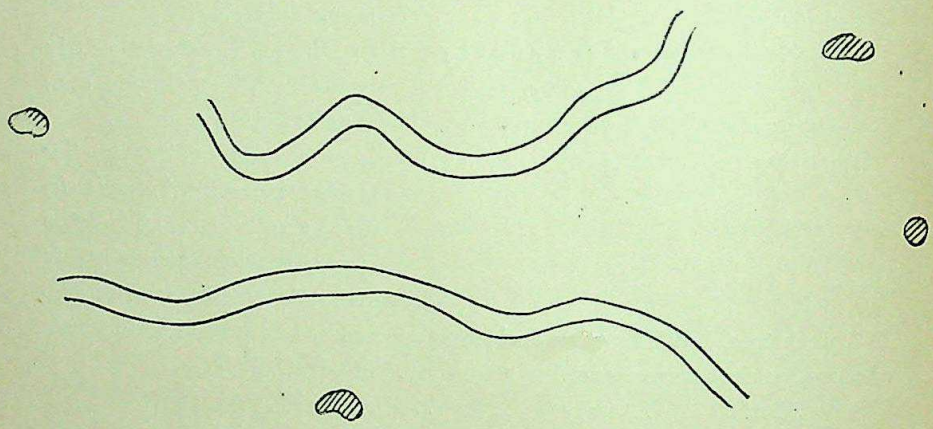
* Mr. Shortridge's notes were submitted to Mr. Wroughton who has added a few remarks in brackets under his initials R. C. W.—EDS.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

No. VI.—THE HABITS OF VOLES.

Where voles of the genus *Microtus* are common in Kashmir and Himalayas, a curious phenomenon is revealed, on the melting of the snow, which covers their burrows in winter, in the long tortuous ridges of clay left lying on the surface of the ground. These ridges, often some yards in length, are *solid* throughout, more or less cylindrical, and from 2 to 3 inches in diameter in section. As often as not they are unconnected at their extremities with the entrance holes of the voles. The rough sketch below will perhaps explain my meaning better than the description, *viz*:—



A friend who had also noticed and taken an interest in these curious ridges informed me that he had once found them in the melting snow on a hillside, *running through the snow and not in contact with the ground though close above it.* This discovery shed some light on what was a perplexing puzzle, and led to the formation in my mind of the following vague theory of their origin, one which however does not altogether satisfy me.

If any of our readers can enlighten me with the true and scientific explanation I shall feel indebted to him or them.

I imagine then that, when their burrows are buried deep in snow, these voles abandon their usual habits of burrowing connecting passages underground (such passages being likely to collapse when the snow melts, and thus to lead to flooding of burrows), and construct instead passages *along the surface of the ground and through the snow.* But, in order that these passages may be kept dry and warm, earth is pushed up into the snow to form a roof above and possibly walls along the same, the earth for this purpose being excavated and brought from the holes, as *no trench is ever apparent under the ridges in question or connecting the holes.* When the snow melts on a slope these ridges can rarely, owing to force of gravity, be deposited on the ground vertically below the position they occupied in the snow, and must therefore often come to rest some little way down hill.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

This explains their seeming lack of connection with the holes when found on dry ground. On deposition also the walls, if any, would tend to collapse and quickly assimilate with the surrounding soil.

Whatever the explanation of these mysterious ridges, however, they, at all events, bear silent witness to the activity of these little rodents when their homes are buried deep in winter snows and show that hibernation is not entirely spent in sleep.

KASHMIR, 1912. H. A. F. MAGRATH, Lt.-Col.

No. VII.—THE INDIAN BUFFALO (*BUBALUS BUBALIS*).

In the Bellary Gazetteer published in 1904, attention is drawn to the fact that "Many of the buffaloes in the district are peculiar in having a white patch between their horns." I have noticed that this is also of frequent occurrence in the North Kanara, Mysore and Dharwar districts, the white varying in size from a small patch, to the whole forehead; more rarely extending over the face. Another curious form not uncommonly observed is that in which the eyes are of a clear, almost China-blue instead of the usual dark brown.

In Blanford's "Fauna of British India" the only mention of any colour variety of the domesticated buffalo is "that the legs are occasionally white to the same height as in the Gaur," while the fact is noted that few of any animals have changed less in captivity than the Indian buffalo.

It would be interesting to know if this variety with the white forehead is peculiar to the south, or whether it is found throughout India.

Any one who has been in Java may have noticed the extremely large number of entirely albino buffaloes there, quite 20 per cent. of those on the island.

The Banting (*Bibos sondaicus*) is also very successfully domesticated in Java and Bali where it is indigenous.

G. C. SHORTRIDGE.

CAMP, BELLARY, *August* 1912.

[Both the variations mentioned by Mr. Shortridge are to be seen amongst the dairy buffaloes in Bombay which come chiefly, we believe, from Gujarat, Kathiawar and the Punjab.—EDS.]

No. VIII.—TSINE (*BIBOS SONDAICUS*) CONSORTING WITH TAME CATTLE.

I was greatly interested in Mr. Hauxwell's note in the Journal published in July of a bull Tsine (*Bibos sondaicus*) consorting with tame cattle. To quote Mr. Hauxwell, "it is not an old bull, and it is strange why it should have taken to this solitary life. Can it be that it has been driven out or

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

the herd by an older and stronger bull, and so forced to come to the village cattle for companionship ? "

I make no doubt that this is exactly what has occurred. I have known of three similar cases, two of Tsine consorting with tame cattle, and one of a Gaur which had attached itself to a herd of tame Mithan (*Bibos frontalis*). All three were young bulls—I have also heard of an old bull Tsine which was supposed to frequent cultivation in pursuit of tame cattle ; but as my informant was a Burman it is possible that he may have been deceived by the size of animal into thinking it an old bull. An old bull Tsine shot by me was said to be this very beast, but I always had my doubts on the subject. His tracks were found some miles from the nearest cultivation and he was killed in dense Bamboo jungle. Still he may have consorted with tame cattle from time to time and the fact that he was well past his prime lends colour to the supposition. As all sportsmen know who have hunted Gaur and Tsine frequently, it is by no means an uncommon occurrence to come across quite young bulls leading a solitary existence, and the only explanation that presents itself is that they have been driven from the herd by the master bull. One would naturally expect, therefore, that when Tsine are found consorting with tame cattle they would be young bulls, or very occasionally old bulls past their prime. The sexual instinct would naturally be stronger in young bulls than in animals past their prime, and the former would also be less shy and wary than the old stagers. At the same time it is conceivable that in the case of very old bulls driven from the herd by stronger rivals, the sexual instinct would in some cases assert itself and the animal, debarred from consorting with its own kind, would occasionally take refuge in an artificial existence rather than become a recluse for good. Such cases, if they occur at all, must be of rare occurrence, and it would be interesting to have authenticated data on the subject. I do not know of any case of a bull in its prime—whether Gaur or Tsine—consorting with tame herds of Mithan or cattle, and it would seem to be extremely unlikely that any such could occur. My own theory is that when such animals take to a solitary existence they do so from choice, and merely for the time being. It was once my good fortune to shoot an erstwhile solitary bull Tsine while with a herd which he had joined on the day he was killed. This beast was a bull in his prime with a very fine head, showing no signs of advanced age. He had merely joined a herd when it suited him to do so. It may be asked why such an animal finding itself near a herd of village cattle should not join them as a younger beast occasionally does. The obvious reply is that the younger animal having been driven from a herd of his own kind is faced with two alternatives—either to remain solitary until old enough to take possession of a herd or to consort from time to time with tame cattle. The older beast on the other hand can appreciate a herd whenever inclined to do so ;

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

for even if driven from his own herd—an unlikely supposition—he is sufficiently powerful to find other herds in which he can hold undisputed away. But I would not be held to dogmatise on a subject of which we know very little. I state my theory for what it may be worth, in the hope that some observer with more knowledge of the subject than I can lay claim to will be able to throw more light on this very interesting question. While no one can account for the vagaries of individuals even in the animal world, it will, I think, be admitted as a general rule that for wild animals to consort with tame is an unnatural state forced on them by circumstances beyond their control, and that no animal having access to its kind is at all likely to seek an artificial existance even for a short period.

MALAKAND, *20th August* 1912. G. P. EVANS, MAJOR,
XIX Punjabis.

No. IX.—HABITS OF THE KASHMIR STAG (*CERVUS KASHMIRIENSIS*) IN SUMMER.

The comparatively high altitudes to which the Kashmir Stag ascends in summer has probably attracted little attention, interest in this animal being, as a rule, confined to the shooting season when it descends, and keeps mainly to the forest levels. This year I frequently saw 'Barasing' (so called) and their numerous tracks on a hill top, 14,000′, and on one occasion observed a herd of about 16 hinds at 14,000′ and still climbing by a track which would take them to the water shed 15,000′ and over, and for which I have little doubt they were making. These high ascents, far above forest levels, are made in the mornings, and are generally for the purpose, besides grazing, of indulging in a midday siesta at some elevated spot where fancied security from enemies may be obtained.

The unwariness of a big stag met with one day afforded me what must be a rare, if not unique, experience. On a hillside at 13,500′ the sudden appearance of what, at first sight, looked like a great caribou head, over a snow field above me caused me considerable astonishment. But realizing that caribous do not exist in the Himalayas, and that it was a big stag in velvet, I had to deal with, I stood and watched, and saw the 'head' slowly sink behind the snow again. Feeling sure that the owner thereof had settled down to rest I decided to stalk him. The only route lay to windward and a fresh breeze was blowing across the hill. Notwithstanding I managed to reach unobserved and unwinded a small mound behind which I suspected he was lying. Creeping up and peeping cautiously over, there, sure enough, lay the great beast—a true 'monarch of the glen' fast asleep and only 16 yards (paced) away. Luckily my terrier, who was

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

behind me, did not scent or spot the sleeping animal, and I was able to survey him at leisure. Though he lay with head towards me and I was quite conspicuous, taking little trouble to conceal myself, he never winked an eye, only his ears flapped lazily keeping off the flies. The head was a fine one (12 pointer) but thick in velvet. The coat was patchy and evidently in process of being shed. I gazed my fill, then dropping quietly behind cover again, left him to his siesta and passed on up the hill. As luck would have it my camera was not with me that day and I have since often regretted the unique snapshot lost. From a coign of vantage, some 800 yards beyond and above, not a movement of the stag could escape me so I sat and munched my sandwiches and enjoyed the panorama of snowy peaks and glaciers spread before me.

For 2 hours or more he slept peacefully. Then, rising, shook himself, sauntered across the snow, and proceeded to drink at a puddle left by the melting snow, after which he began to drop slowly down hill, on the steep side, browsing the while. Wishing to have a last look at him on my way down I made for the spot where he had disappeared from view and peered over.

There he still stood, some 80 yards below, browsing quietly. I let him see me but he evinced little sign of fear, merely dropping a few feet lower, and resuming his browsing. But for my terrier which, this time, spotted him and gave him chase, I could have approached him much closer. Seeing the terrier he rattled down hill and out of view, leaving a void in the picturesque landscape.

When descending a hill these stags look awkward and clumsy compared with the graceful bounding movements of Markhor or Ibex.

Some days later a further curious experience with Kashmir Stag befell me on this same hill. Climbing it with a brother officer we had a cooly with us carrying our paraphernalia. When some way up I asked the latter if he had ever been on this hill before and if he knew that "Barasing" lived on top. He replied that he had not, and expressed a desire to see a "Hangul." This I undertook to promise to show him. Within 5 minutes of this conversation, appearing slowly over a ridge to our left, we saw the antlers of a big Barasing, then the whole animal standing on the sky line. Following him came another, then another, and still others, until there were *five* grand stags, all apparently good shootable heads, standing in full view and barely 400 yards away! No one was more astonished than I, for although feeling pretty confident of meeting with *a* stag that day, I was not prepared for the splendid fulfilment of my promise in the vision we had just seen. For some days after this I believe I bore the reputation of being a "Jadu-gar."

H. A. F. MAGRATH, Lt.-Col.

Kashmir, *August* 1912.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

No. X.—ABNORMAL TYPE (?) OF EGGS OF THE LITTLE FORKTAIL (*MICROCICHLA SCOULERI*, Vigors).

On the 12th May last, I found a nest of this species placed in the niche of a rock by the side of a large waterfall in the neighbourhood of Simla. The position of the nest was betrayed by one of the birds, which hurriedly left the spot on my approach. On examining the nest I found that it was practically completed, and was ready for the birds to lay in. Allowing a few days to elapse I sent one of my hunters to bring away the eggs, if any, and also the nest. He carried out my instructions, but, on examining the eggs, which were quite fresh and three in number, I was much astonished to find that they were *pure spotless white*. I immediately questioned my man as to the identity of the bird, which he knows *well*. He firmly maintained that the eggs in question belonged to this Forktail, that he had distinctly seen it leave the nest on his approach, and that when he removed the eggs they were quite warm. I have no reason whatever to doubt the man's statements, for I have always found him truthful, and in this instance there was no particular reason for him to deceive me; but nevertheless I still feel rather disturbed about the colouration of these eggs. Had I for a moment foreseen this contingency, I should of course have spared no pains to put the identity of the bird beyond doubt. As things stand now, *there is doubt* but doubt which can be dispelled by the experiences of other Ornithologists.

I should like to know whether this Forktail, like some other birds, for example, *Dicrurus ater*, lays eggs of two different types: one, pale dingy pink, spotted and speckled with reddish brown, and the other pure spotless white?

The eggs from this nest are, as already stated, pure spotless white, and they have a distinct gloss. In shape they are somewhat elongated ovals, slightly pointed towards the small end. Their measurements compare as follows with those of the normal type:—

Abnormal type (?) of eggs.	*Normal type of eggs.*
(1) ·81″ × ·58″	Average measurements of 11 eggs
(2) ·82″ × ·58″	= ·79″ × ·57″
(3) ·85″ × ·6″	

I may add that there is no doubt whatever about the nest. It was of the usual Forktail type—a small cup, composed externally of moss, and lined with a little dry grass, and a few dead and skeleton leaves.

Since the publication of my notes about this species at pages 257—261 of Vol. XXI of the Journal, I have found the following nests in addition to the one mentioned above:—

(*i*) *Keonthal State*, 1st May: elevation 5,000 feet; nest with three young, just hatched.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

(*ii*) *Keonthal State*, 21st May; elevation 5,000 feet; 3 hard set eggs (normal type).

(*iii*) *Ditto.* 21st May; elevation 5,000 feet; two young, full fledged.

P. T. L. DODSWORTH, F.Z.S., M.B.O.U.

SIMLA, S. W., 29*th August* 1912.

No. XI.—NESTING OF THE WESTERN BLUE ROCK THRUSH (*PETROPHILA CYANUS*, Linn) IN THE NEIGHBOURHOOD OF SIMLA, N.-W. HIMALAYAS.

After several years of fruitless search, I have at last succeeded in finding the nests of this species, which is a tolerably common summer visitant to these N.-W. Himalayan ranges, arriving in April, and leaving about the beginning or middle of September.

In the neighbourdhood of Simla, it breeds at elevations of 6,000-7,200 feet, on bare rocky hills, during May and June. The nests are shallow saucers, in some cases mere pads, adapted to the shape of the cavities in which they are placed, and are composed externally of dry grass, lined with rootlets. The diameter of the egg-cavity does not exceed 4″, and its depth is about 1½″. The external diameter varies from 5 to 6″, and the height is about 2½ or 3″. The nests are placed sometimes in low stone walls occasionally under boulders, but more frequently in fissures or crevices of large rocks.

The number of eggs is usually four, and their colouration is exactly as described by Dresser in his "Manual of Palaearctic Birds", page 23. The "speckled" eggs seem to be the commoner type.

The average of 12 specimens measured was 1·01″×·75″.

Between the dates 18th May and 20th June, I found, in addition to the eggs mentioned above, no less than eight nests containing young ones. Five of these nests had three young each, and two, four young each: the exact number of young in the eighth nest could not be satisfactorily ascertained, as the latter was placed very far back in the fissure of a large rock.

The nests of this Thrush, especially when they contain eggs, are most difficult to find, as the old birds are very cautious and wary in their movements, and it is only by patient and laborious watching that one can hope to be successful with them. The cock bird, though he helps in feeding the young, and is always much in evidence when the eggs are hatched, keeps far away from the scene when building operations are in progress. The hen alone carries the materials, and if she catches sight of one, or suspects that she is being observed, will sit on a rock, with the grass in her mouth, for whole hours at a time, rather than give away the show.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

When there are eggs in the nest the hen bird sits very close, and on two occasions I have caught her on the nest. So far as my experiences go, I do not think that the cock takes any part in the hatching of the eggs.

P. T. L. DODSWORTH, F.Z.S., M.B.O.U.

SIMLA, S. W., 29*th August* 1912.

No. XII.—THE HIMALAYAN GREENFINCH (*HYPACANTHIS SPINOIDES*).

In Mr. P. T. L. Dodsworth's interesting note on *Hypacanthis spinoides* (The Himalayan Greenfinch) in Vol. XXI, No. 3, p. 1076 of this Journal, he gives the distribution of this species as follows :—"Along the Himalayas at elevations 6,000—10,000 and perhaps even higher from the south side of the Pir Panjal Pass in Kashmir (Brooks) to Sikkim (Blanford) also recorded from Manipur (Godwin Austen). During the cold weather these birds move to tower elevation, and the N.-W. Himalayan ones at all events are found in the Duns and plains (Bijmor to Pilibhit) at the foot of the mountains (Osmaston). In quoting this as the distribution Mr. Dodsworth has apparently overlooked various publications in this Journal from the pens of Colonel Rattray, Captain C. H. T. Whitehead and others which add considerably to our knowledge in this respect and shew that the range of The Himalayan Greenfinch extends very much further to the North-West. For example it is common in the Murree Hills and Hazara. It occurs in the N.-W. F. P. (Samana), and not improbably breeds in the Kurram Valley. I may add also that in parts of the Peshawar Valley it is a common winter migrant, being freely snared there for the Peshawar bazaars, where it is a favourite cage bird with the Pathans. With regard to Kashmir its range extends well north of the Pir Panjal and the Vale of Kashmir itself, in the Liddar and Sind Valleys, it breeds commonly from 7,000 to 9,000 ft.

H. A. F. MAGRATH, LT.-COL.

KASHMIR, *August* 1912.

No. XIII.—EARLY ARRIVAL OF GREY WAGTAIL.

I am sending you a specimen of what I think is the Grey Wagtail (*Motacilla melanope*) shot near here on the 22nd August, by a stream in the midst of dense jungle. Chikalda is 125 miles south of Sehore as the crow flies; but Capt. Whitehead, in his article which appeared on page 153 of Vol. XXI of the Journal, notes its earliest appearance at that place as the 20th September. Considering how late the rains broke here, not until the 10th July, and that it breeds in Kashmir above 6,000 ft. and in Afghanistan in May and June (dates on p. 294 of Vol. II, F. B. I.) This must be distinctly an early bird.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Will you kindly verify my identification of the specimen which is unfortunately in a somewhat shattered condition ?

J. DONALD, I.F.S.

CHIKALDA, BERAR, *22nd August* 1912.

[The bird is as Mr. Donald suggested a Grey Wagtail *M. melanope*.—EDS.]

No. XIV.—EGGS OF THE LARGE HAWK-CUCKOO (*HIEROCOCCYX SPARVERIOIDES*).

In his "Indian Parasitic Cuckoos" Mr. E. C. Stuart Baker reproduces an article of his printed in the Journal of the Bombay Natural History Society in 1906. The article shows that at the time of writing, the oology of this cuckoo was not so thoroughly known as not to require further investigation. Colonel Rattray was then the only person who had obtained undoubted eggs of the bird, and though these were blue Mr. Stuart Baker hinted at the possibility of there being also a chocolate coloured variety.

For many years my brother Mr. B. B. Osmaston has tried to obtain eggs of this cuckoo from the Himalayan region round about Naini Tal where at suitable elevations it is no uncommon bird. During the rains of 1911, he found a nest of the Red-headed Laughing-Thrush (*Trochalopterum erythrocephalum*) close to Naini Tal and it contained two Laughing-Thrush's eggs. Intending to rear the young birds he sent his chaprassy a few weeks later to fetch them. The chaprassy returned with a young cuckoo, the sole occupant of the nest, and the cuckoo proved to be a young one of *H. sparverioides*.

We now knew that this cuckoo laid her eggs in the nest of this bird, and we decided to thoroughly search the same place again this year for eggs. The hill overlooking Naini Tal rises to a height of 8,600 feet, and for the last 1,000 feet the vegetation is chiefly "Karshu" oak mixed with shrubs of various species. There are scarcely any birds breeding here during the rains excepting the Red-headed Laughing-Thrush (*Trochalopterum erythrocephalum*) and Himalayan Streaked Laughing-Thrush (*Trochalopterum lineatum*) and of these the former is by far the commoner. In the beginning of June my brother visited the place and found the Large Hawk-Cuckoo calling incessantly and in considerable numbers, but the Redheaded Laughing-Thrushes had hardly commenced nesting. At the beginning of July the cuckoos were still continually to be heard and the Laughing-Thrushes were nesting in earnest.

On 7th July I found a nest of *T. erythrocephalum* containing two fresh Laughing-Thrush's eggs and one fresh cuckoo's egg. The nest was about six feet from the ground in a dense holly bush. When I took the eggs a cuckoo (*H. sparverioides*) was calling lustily only fifty yards away.

On 18th July I found another nest of *T. erythrocephalum* containing one

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

fresh cuckoo's egg. The nest was placed about 8 feet from the ground in a small Deodar. There is some mystery about this nest as it contained no Laughing-Thrush's eggs nor were the parents lurking round as they usually do. In fact there had evidently been some tragedy recently enacted for the nest contained besides the cuckoo's egg, a small piece of fresh meat with a little skin and a few bedragled feathers adhering to it. The nest, however, was not disturbed. When I found the nest a cuckoo was calling persistently only 100 yards away.

On 28th July I found another nest of the same Laughing-Thrush about eight feet from the ground in a young oak tree. It contained one Laughing-Thrush's and one cuckoo's eggs, both quite fresh. This time I did not hear the cuckoo calling as on previous occasions.

These three nests containing cuckoo's eggs were all found within a quarter of a mile of one another, and on the many occasions on which I hunted the locality I never failed to hear the cuckoo calling close round, yet never heard the call of any other cuckoo. The elevation was about 8,200 ft. Though there is no absolute proof of their identity there is little room for doubt, considering also that they agree with the authenticated eggs obtained by Colonel Rattray.

All three eggs are of the same colour and texture. They are pale greenish-blue (almost exactly the same blue as the ground colour of the Laughing-Thrush's eggs) and distinctly glossy. They are also traced by distant corrugations and minute raised dots. Their shape is a narrow oval compressed at the smaller end in two of the specimens, but not in the third. The dimensions of the eggs are as follows :—

Egg taken on 7th July 1912	.. ..	1·18″ × ·81″
,, ,, 18th July 1912	.. ..	1·10″ × ·81″
,, ,, 28th July 1912	.. ..	1·11″ × ·84″

The eggs of the Laughing-Thrush are ordinarily spotted round the larger end though occasionally unspotted eggs occur, but even in these rare cases the cuckoo's eggs may be at once recognised by their glossiness, those of the Laughing-Thrush being entirely without gloss.

NAINI TAL, 21*st August* 1912. A. E. OSMASTON.

No. XV.—QUESTION WHETHER *GYPS FULVUS*, Gmelin, THE GRIFFON, OCCURS IN THE HIMALAYAN DISTRICTS OF THE PUNJAB.

Assuming that the *Gyps fulvescens* of Hume is identical with the *Gyps fulvus* of Gmelin, the common Griffon of Europe, I should feel much obliged if some Ornithologist would kindly let me know whether he has observed this bird in the *Himalayan* districts of the Punjab, and, if so, at wha places ?

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Strachey records * it from Kumaon, and Blanford gives (Fauna, B. I. (Aves), iii, p. 320) its range in the *Himalayas* as extending east as far as Nepal and Sikkim, but I have been unable to trace all the data on which the latter statement was founded.

The common species in the neighbourhood of Simla is the Himalayan Griffon, *Gyps himalayensis*, Hume. And this is the Vulture, not *Gyps fulvus* that Colonel C. H. T. Marshall mentions (Ibis, October 1884, p. 405) in his list of Chamba birds.

Hume spoke (Rough Notes, p. 21) of the Griffon—his *Gyps fulvescens*—as the "Vulture of the desert," and it seems only reasonable to conclude that if it had occurred in the N. W. Himalayas, he would surely have mentioned the fact.

I see that Colonel Ward includes (J. B. N. H. S. Vol. XVII, p. 728) *Gyps fulvus* in his birds of Kashmir, where, he says, it is resident in many districts, but on the other hand it is significant that Davidson never saw it there (Ibis, January 1898), and all the Vultures procured by Dr. Abbott (Proc. U. S. N. M. Vol. XVIII, p. 453, and Vol. XXII, p. 210) in that country turned out to be Himalayan Griffons—a totally different species.

P. T. L. DODSWORTH, F.Z.S., M.B.O.U.

SIMLA, S. W., 27*th May* 1912.

[In 1869 Hume described *Gyps fulvescens* and on account of the knowledge of its distribution then wrote of it "as the Vulture of the desert." Since, however, this vulture has been recorded from Nepal and still later under the name of *Gyps fulvus* by Colonel Rattray from Thull and Captain Whitehead from the Kurram Valley. Though Dr. Blandford treated *fulvescens* as a synonym of *fulvus*, Dr Sharpe both in his catalogue and hand list considered them distinct giving the distribution of *fulvus* as "S. and C Europe, N. Africa and Sudan," and that of *fulvescens* as "Afghanistan, N. India"—EDS.]

No. XVI.—A KITE'S LARDER.

With reference to Mr. Remington's enquiry in the last issue of the Journal, I do not think it is usual for this species (*Milvus govinda*) to make "larders." During a course of observations extending over several years, I have only once come across a "larder." It was in Calcutta where, on a certain tree, a pair of these Kites have bred for several years in succession. From my Office window the nest was not distant more than 10 feet, and I had ample opportunities of closely observing the owners. I noticed that the Kites frequently brought dead rats, bones, pieces of meat, and ate them on the edge of the nest, leaving the scraps behind to

* Is it possible he confused this bird with *Gyps himalayensis*, Hume ?

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

be devoured at leisure. Both the old birds resorted to this "larder" at frequent intervals during the course of the day, and for many months after the young had left the nest.

In connection with the breeding of this species, I may mention that I have frequently found lumps of clay and small stones in their nests when the latter contained eggs (see also Jesse in "Ibis," January 1903, p. 75), but have never yet been able to make out what purpose this rubbish serves. I daresay other Ornithologists have had similar experiences, and it would be interesting to know what explanations, if any, have been advanced in regard to this curious practice indulged in by these Kites.

P. T. L. DODSWORTH, F.Z.S., M.B.O.U.

SIMLA, S. W., 29*th August* 1912.

No. XVII.—TAMENESS OF GREAT INDIAN BUSTARD (*EUPODOTIS EDWARDSI*).

With regard to the recent articles on Bustard in your Journal, readers may be interested in hearing that, in spite of the extreme wariness of the Great Bustard, on the 15th of May this year, I came upon a pair of these birds wading at the edge of a large pond and drinking. The pond itself is about half a mile from a town of considerable size and there were at the time a group of dhobies washing clothes on the opposite side of the pond within 200 yards of the Great Bustard. I myself walked to a point just opposite them, and about 90 yards distant from them, so there can be no mistake about their identity. I enquired whether any had been seen before in the locality and was informed that they had not. It would also appear that these particular birds were in the practice of coming here to drink, for a friend of mine who happened to visit the pond some three days later also says he saw them. I do not suppose for a moment that it is an unknown characteristic of the Great Bustard that he should come to drink at ponds, but I am surprised that such a retiring bird as he should come to drink at a popular dhobies' ghat.

R. TEAGUE JONES,
Indian Police.

FEROZEPORE, PUNJAB, 4*th August* 1912.

No. XVIII.—BUSTARD IN KATHIAWAR.

In ordinary years during my district touring in Sorath Prant I have occasionally come across a solitary Great Indian Bustard (*Eupodotis edwardsi*) sometimes two or three together, but they are by no means

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

common. This year owing to the failure of rain in other places I suppose these birds have been seen in large numbers throughout the Prant. In all I have seen over fifty close to my headquarters alone. In one morning I came across two distinct groups of 9 and 10 together. At the time of the bajri harvest they could be easily bagged with a shot gun, being feeding so busily as to be quite off their guard, and I once got two fine cock birds 18 and 20 lbs. in weight, left and right. After the crops were cut they could only be bagged with a rifle. One male bird of 16 lbs., I had shot with a ·310 rifle and on picking him up by the legs to feel his weight a long red thing dropped from his mouth. On examining it closely I found it to be the partially digested body of a snake about 2 ft. long. In the stomach of the same bird I found another snake, "a phoorsa," evidently recently swallowed, and two stones measuring 1¼ inches by 1 inch. I have got the snakes and stones in spirits and will send them to you on the first opportunity. As the hot weather advanced the Bustard disappeared and I have not seen one since early in April.

J. R. CARTER, MAJOR,
Bombay Political Department.

CAMP VERAVAL, *7th June* 1912.

No. XIX.—THE GREAT INDIAN BUSTARD (*EUPODOTIS EDWARDSI*).

During a shoot in February 1906 in the Bikaner State near Bhatinda, with a party of four guns, Mr. R. Sale Bruise, Punjab Police of Karnal, shot a male bustard. The neck of the bird was pure white, its length from tip of wing to tip of wing was exactly 98 inches and the weight 24lbs. The food bag contained, whole ears of barley; some (blister?) beetles, and a snake about 9 inches long.

Two females were also shot close by, but they weighed only 8 and 9 lbs. They had also been feeding on barley and beetles, but had been unfortunate in their hunt for reptiles.

A. B. AITKEN.

QUETTA, *20th August* 1912.

[We are glad to welcome this note from Mr. A. B. Aitken, the son of the late Mr. E. H. Aitken, one of the founders of this Society.—EDS.]

No. XX.—THE MASKED BOOBY (*SULA CYANOPS*) IN BOMBAY HARBOUR.

Through the kindness of Mr. E. R. H. Jackson of the Bombay Port Trust, the Society has received a fine specimen of the Masked Booby, which was captured in an exhausted condition on a dredger near the new

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

dock works. In 1909 a similar specimen, also captured in the harbour was presented by Mr. Jackson and there is another specimen in the Society's collection labelled "Bombay Coast, 25-7-02". Mr. W. F. Sinclair writing of this bird in an early number of the Society's Journal says that "It is not uncommon for these birds to be brought up here (Alibag) by south-westerly gales and be caught by hand."

According to the catalogue of birds in the British Museum this bird is found in the tropical seas throughout the world, but when the catalogue was published there were in the collection only two skins from north of the equator, one from Tenasserim and the other from the Mekran Coast. In the Handlist of birds, however, the distribution is given as "S. Tropical Seas."

N. B. KINNEAR.

BOMBAY, *August* 1912.

No. XXI.—BAIKAL OR CLUCKING TEAL (*NETTIUM FORMOSUM*).

The S. S. "Empire" of the Eastern & Australian Line on her homeward voyage from Japan to Australia in January 1912 had on board a consignment of about 300 Baikal or Clucking Teal in cages. The cages were kept on the bridge deck out of the way of the passengers, where they could not be seen. The passengers in the smoking saloon of the upper deck were always aware of the continual clucking noise that the teal made. The noise was very similar to that made by a clucking hen. In fact all the passengers were under the impression that the Captain, for some reason known only to himself, had a large stock of clucking hens on the bridge deck. One passenger, who was told that the noise proceeded from ducks, would not believe till he saw and heard with his own eyes and ears. The purser was unable to give any information beyond the fact that the teal had been shipped in Shanghai and were consigned to Port Darwin, and that a similar consignment was carried on every voyage.

A. B. AITKEN.

QUETTA, 20*th August* 1912.

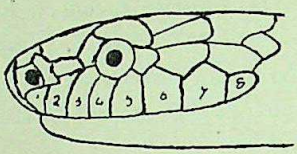
No. XXII.—IS *LYCODON GAMMIEI* (Blandford) AN ABERRANT SPECIMEN OF *LYCODON FASCIATUS* (Anderson)?

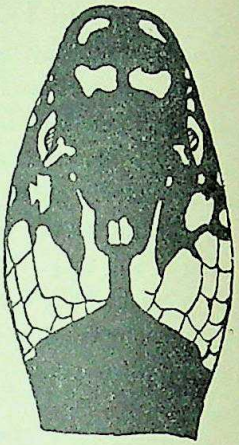
In Vol. XXI of the Journal (Part I, page 279) Major Wall compared my specimen of *L. fasciatus* obtained in the Eastern Himalayas with the type of *L. gammiei* which is in the Indian Museum.

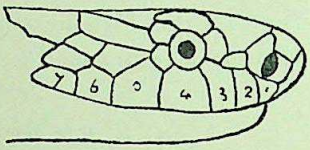
Regarding the point of the loreal shield, I must admit that it is pointed, to some extent, posteriorly and not anteriorly as stated, the third labial and the præocular intervening between it and the eye.

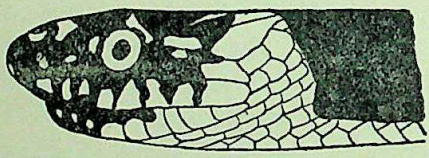
CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri









I figure the exact condition of this shield and also a drawing of the markings on the head. The dark portions are deep black and the rest yellowish green. The illustration is about twice the natural size.

NAGPUR, C. P., 13*th August* 1912. E. A. D'ABREU, F.Z.S.

No. XXIII.—NOTES ON THE SIZE AND BREEDING OF THE COMMON GREEN WHIPSNAKE *(DRYOPHIS MYCTERIZANS)*.

Two common green whipsnakes were recently purchased from a snake-charmer, who said they came from Thana and Bandup (Salsette) respectively. Both were large specimens, the Thana one measuring 6′-4½″, while the other was 5′-10″.

On 14th August the larger of the two specimens died in our museum and on being dissected was found to contain fifteen young ready for expulsion. Two days later the remaining specimen gave birth to eighteen young, one of which was born dead, having been unable to clear itself of the egg envelope. The remaining young sloughed on the second day after birth. They measured 13 inches.

BOMBAY, *September* 1912. N. B. KINNEAR.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

No. XXIV.—COBRA BREEDING AT PAREL.

During the past ten years many of the cobras (*Naia tripudians*) sent to the Bombay Bacteriological Laboratory have laid eggs while in captivity, but hitherto all attempts at hatching out young cobras have proved failures. Whether left with the mother, or kept apart from her, the eggs have always shrivelled up and no development of embryos took place. When kept in an incubator at blood-heat, the eggs became rotten in a few days, and when buried in dry sand they shrivelled up.

In 1905 a full grown krait (*Bungarus cæruleus*) and some half dozen eggs were dug up close to the Laboratory. Some of these eggs were kept in a box with the mother, and some were buried in the soil in which they were found. Both sets of eggs remained infertile.

In 1909, Major Liston, I.M.S., suggested that the cobra mother and her eggs should be placed in a glass case half full of sand, that the case should be darkened by winding cloth round it, and that the sand, and the cloth cover of the case be kept moist. Next day one egg was examined and a trace of embryo found. Unfortunately the mother died 9 days afterwards, and the eggs shrivelled up.

This year (1910) we had occasion to require a considerable number of cobras for experimental purposes, and four out of 21 laid eggs, and gave us the chance of experimenting further. Two of these cobras laid 21 and 22 eggs respectively, the other clutches were not counted as the eggs were glued together and mixed up with shreds of the mother's cuticle, and it was thought advisable to leave them alone. These latter batches all proved failures as far as hatching out young ones was concerned.

With regard to the period of the year when young cobras may be looked for, our experience is that the month of May is the usual time. Thus from 1st January to 31st May 1910 we received 24 cobras, of which 4 laid eggs; while after the 31st May 25 more cobras were received and none laid eggs

The following table shows the date of receipt of cobras, and the laying of eggs :—

Number.	Date of receipt of cobras.	Date on which cobra laid eggs.	Place from which received.
28	11-1-10	12-5-10	Khandwa.
30	11-1-10	14-5-10	,,
39	20-4-10	11-5-10	,,
42	30-4-10	9-5-10	,,

The following is an account of the plan we employed with success in the case of the eggs of cobra No. 28 :—

The eggs were laid in the tin biscuit box in which the cobra was kept on 12th May 1910. The eggs, 21 in number, were placed on the surface

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

of moist earth which four-fifths filled an ordinary garden flower pot. The eggs were then carefully covered with dry sifted earth to a depth of one inch, and the earth also slightly moistened. The pot was kept in a cool dark room. Next day we carefully removed the covering earth and found to our joy that the eggs were plump and fresh, looking though, of course, stained by the damp covering. The earth was replaced, and carefully sprinkled with water by old Benjamin, the snake man, who took quite a naturalist's interest in the proceedings. We had no idea of the incubation period of snakes' eggs, so sent Benjamin to enquire of some Bombay snake-charmers. He brought back news that 21 days was the recognised time. So on the 2nd of June, 22 days afterwards, we dug out one egg and opened it to see what progress had been made. The egg was quite plump and fresh looking, and contained a quantity of clear albumen, with a well formed embryo in one end of the shell. The small embryo snake was coiled up beside the yellow yolk, and with a small cord connecting it to a placenta attached to the shell. The embryo was white in colour, almost four inches long, and the heart could be seen distinctly pulsating. No scales could be made out on the skin, but the head, was large with two prominent eyes.

On the 23rd of June, *i.e.*, on the 43rd day, we opened another egg, and found another living embryo in a further stage of development. It was some seven inches long, with well developed scales on the skin, and the heart could be seen beating vigorously.

The pot was watered daily as before, and was covered with wire netting as a precaution against the escape of the young should they happen to hatch out during the night. At length on the 18th of July, 67th day, a cobra head was noticed protruding, as far as the neck, from the egg shell. This specimen was removed from the flower pot and carefully washed in a basin. On enlarging the opening a little the embryo emerged with the placenta still attached.

On the following day others were found in a similar condition. They were left alone all night to see if they had strength to deliver themselves. Two had succeeded in this endeavour, but one of them being dead, it was thought advisable to render artificial aid to the others, and several of the little cobras lived for several weeks after. It was noted as a curious fact that all the young cobras had well developed spectacle marks on their hoods, although the mother was a black "cæca" from the Central Provinces, with no trace of a spectacle mark on the hood!

The new born cobras had a cutting chisel on the snout of the same shape and appearance as that described by Major Wall in the Society's Journal, Vol. XXI, page 693. Major Wall saw the specimens, but unfortunately the notes on the subject which he kindly jotted down have been mislaid owing to the transfer of one of us (Col. W. B. Bannerman, I.M.S.) to Madras.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

In all, 21 eggs were placed in the flower pot. Two were opened to see what progress the embryos had made; four were found shrivelled (on 4th June) and proved on dissection to be infertilised and quite solid. Of the 15 remaining eggs, 14 hatched out at full time, and one was dead in the egg but appeared fully developed.

W. B. BANNERMAN, I.M.S.,
Surgeon-General.

J. P. POCHA, LM. & S.,
Senior Assistant Surgeon.

BOMBAY BACTERIOLOGICAL LABORATORY,
PAREL, 15*th July* 1912.

No. XXV.—BREEDING OF THE COMMON GREEN VIPER (*LACHESIS GRAMINEUS*).

On 30th June a female Common Green Viper which was said to have come from Khandalla gave birth to fifteen young in our Museum. They sloughed first on 24th July. The brood vary considerably in colour, some being much darker than others and nearly all show the blackish markings on the back, though in the light coloured ones it is very faint. The mother belongs to the variety which has a yellow line along the side of the body, but in the young this line is hardly discernable. It has been found impossible to get the young snakes to feed naturally, though they have been tried with earth worms, young frogs, grasshoppers, young cockroaches and other insects. They have however been fed twice with raw meat and the nine which are still alive look well and are beginnin to grow.

N. B. KINNEAR.

BOMBAY, *September* 1912.

No. XXVI.—SAW-SCALED VIPER (*ECHIS CARINATA*) AS A TREE SNAKE.

Some time ago a note appeared in the Journal stating that the phoorsa very rarely climbs trees. At the time I doubted the correctness of this as regards the habits of this snake in North Gujarat, as ten years ago I frequently found a snake, which I believed to be of this species, on cactus hedges and in bushes and small trees a few feet from the ground. I presumed however that I might possibly have been mistaken in my identification of the species, though I did not think it likely. I have now returned to the same part of the country and find that my original belief was correct. In confirmation I am sending you a specimen of *Echis crainata* which I found this week and killed in the outer branches of a

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

lime tree at a height of 4 feet from the ground. *Echis* is not a difficult snake to recognise if one knows its "points" but perhaps you will kindly confirm my identification.

A. H. E. MOSSE, Capt., I. A.

Palanpur, N. Gujarat, 23*rd July* 1912.

[The specimen sent by Captain Mosse is certainly *Echis carinata*.—Eds.]

No. XXVII.—HABITAT OF *ECHIS CARINATA*.

It is generally supposed that the saw-scaled Viper (*Echis carinata*) is rarely seen at a height of 5,000 feet. Major Wall in his book "The Poisonous Terrestrial Snakes of our British Indian Dominions" writes of the *Echis*: "It is an inhabitant of the plains and becomes progressively scarcer at altitudes ranging up to 5,000 feet. 5,700 feet is the highest I know of."

It is of interest therefore to note that at Kacha Thana, a small outpost in the hills of the Chagai Tahsil of Baluchistan, at an altitude of 5,000 feet, the *Echis* is quite common. During the past three months I have obtained six specimens, all from the Kacha nullah, at heights ranging from 5,000 to 5,400 feet.

Unlike the Persian Horned Viper, another common snake in this locality, the *Echis* is apparently not timid in approaching human habitations. About a fortnight ago while the Officers of the Garrison were sitting in front of the Mess Bungalow before dinner, an *Echis* was observed quietly making its way under the chairs. It passed beneath the whole line of deck chairs and was unconcernedly heading for the verandah when I captured it.

Local Balochis call the *Echis* "landi mar" evidently in allusion to the brevity of its caudal appendage. It is also occasionally named "gwanden mar" or "little snake" in contradistinction to the "shakhwala mar" (*Pseudocerastes persicus*), an altogether bigger and stouter snake and the only other poisonous species common in this part of Baluchistan.

G. G. JOLLY, Capt., I.M.S.

Kacha Thana, 2*nd September* 1912.

No. XXVIII.—"POISONOUS" LIZARDS IN INDIA.

With regard to "poisonous" lizards you may be interested to have one little piece of negative evidence. Last Saturday (17th) being Nag Panchami up here, some of the servants went round showing a number of snakes and a "gubera" (young *Varanus*). We were assured that this was deadly poisonous, but after it had been on show for about three hours—with a string tied round its middle—it apparently got annoyed and turned round and bit the man in his finger. The unfortunate man sucked

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

the wound and looked rather frightened and then went on showing his snakes ; he is still alive and doing his regular work.

H. F. SAUNDERS.

THE FORT, GWALIOR, C. I., 26*th August* 1912.

[This subject was thrashed out in the early numbers of our Journal, Vols. III and IV (1888-9), but the belief is still apparently as strong as ever in Gujerat, Sind, Rajputana, Central India and Baluchistan that the young of the *Varanidæ*—otherwise known as Monitors or "Ghorpads," "gho-samps," also "Bis-cobras"—are poisonous.

It is difficult to trace whence this opinion has arisen. In Kaira, Gujerat, it is known as "Chandan-goli" and is "said to be as deadly as a cobra and able to spring ten paces" (A. Wood, I.C.S.).

Other lizards in India also bear an equally evil reputation, particularly *Eublepharis hardwickii* and *E. macularius*, but so far as can be ascertained *no lizard in India is poisonous.*

According to Mr. E. E. Green "the Brahminy Lizard," the common skink, *Mabuia carinata*, holds a similar reputation in Ceylon. He mentions a case in which a lady was bitten by one of these lizards. The injured finger in a few hours' time became swollen and tender but by next day practically all the swelling and tenderness had disappeared.—EDS.]

No. XXIX.—THE FOOD OF A BULL-FROG (*RANA TIGRINA*).

In Vol. XXI, No. 2 of our Journal, Mr. S. P. Agharkar states a few things about the diet of a bull-frog (*Rana tigrina*) and remarks at the end of his note that "further observations on this point by our members would yield interesting results." Taking advantage of this remark I put down a few observations on the subject.

On the 5th of September 1910 I dissected a freshly caught frog (*Rana tigrina*) before my B.A. students. On opening the animal, the very first thing, which struck me, was the unusual size of the stomach. I made an incision on the wall of the stomach and on carefully examining the contents I found to my surprise a big mole-cricket (*Gryllotalpides*), twenty maggots of a fly, a big beetle (*Scarabæidæ*), a small shell of a snail and some green vegetable product.

On another occasion, I had put a frog in the cage of a John's earth snake (*Eryx johni*) to serve the latter as its food. In the cage as much of the sand was spread as would be sufficient for the snake to hide itself. After 3 days when I saw that the snake would not go for the frog, I took out the latter and dissected it. On dissection it was found out that the stomach was tensely filled with sand. I cannot say definitely whether the frog had swallowed sand to get some nourishment from the small insects in the sand or for some other purpose.

BIOLOGICAL LABORATORY, J. P. MULLAN, M.A.

ST. XAVIER'S COLLEGE, BOMBAY, 16*th August* 1912.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

No. XXX.—VITALITY OF A BUTTERFLY.

While watching a cluster of about thirty *Papilio philoxenus* which were feeding on the flowers of a creeper, I noticed one of these butterflies had a large heavy pin driven through the thorax. It must at some time have been caught and pinned down, afterwards escaping. It was in very good condition and the pin did not seem to interfere in any way with its powers either of feeding or of flight, for when I tried to capture it by taking hold of the pin, it darted away and showed itself as strong on the wing as any other of its kind.

G. A. HASSELS-YATES, Capt., R. G. A.

Khyra Gali, Murree Hills, 11*th July* 1912.

No. XXXI.—THE BED BUG (*CIMEX ROTANDATUS*) ON THE COMMON YELLOW BAT (*SCOTOPHILUS KUHLI.*)

Now that the responsibility of the Bed bug for "Kala azar" has been established, an observation I made in 1907 of the presence of the bug on two specimen of the Common Yellow Bat *Scotophilus kuhli* gains in importance. The bats were taken singly from holes in two cocoanut palms in a village near Tellicherry and were badly infested. Captain Patton, I. M. S., who kindly identified the bugs as *Cimex rotandatus* desired me to collect more bats of the species, but pressure of work of a different kind has left me little leisure to do it and I venture to publish this note in the hope that it will induce others interested to look for the bats and the bug on it.

I may mention what struck me as curious at the time that the bugs were on the bats themselves, rather an unusual habit for the insect. Perhaps the reason was that it was 7 A.M. when I caught them and the bugs starving over night had started just then to feed. The cocoanut trees were about 30 yards from human habitation. The holes on them could not be examined.

K. KUNHIKANNAN, M.A., F.E.S.,
Assistant Entomologist, Bangalore.

Bangalore, *August 24th*, 1912.

No. XXXII.—FLIES ON SNOW.

On the snow covered slope of a glacier in Kashmir at appoximately 15,000 I noticed that part of it, which I was ascending, was discoloured by what seemed to be a coarse, blackish dust, the snow elsewhere being clean and white. My eyes being fixed on this discoloured snow as I climbed, it suddenly dawned on me that the particles of 'dust' were in motion, jumping, and constantly shifting position. At first the thought occurred that I must be suffering from a severe 'go' of vertigo or mountain sickness,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

but closer scrutiny revealed the fact that what I had taken to be dust was, in reality, a swarm of minute *diptera*. These tiny flies were thickly peppered over the snow for a space of 100 square yards or more, and apparently preferred to stay where they were or else were incapable of removing themselves by flight. How they got there, or into the predicament in which I found them, is difficult to conjecture, but if I might hazard a guess, I should say they had been wafted in a swarm, in a warm strata of air, from the valley beyond, and, suddenly meeting with the cold air above the glacier, collapsed and fell on the snow in a body.

KASHMIR, *July* 1912. H. A. F. MAGRATH, LT.-COL.

No. XXXIII.—PRESERVATION OF GAME.

Some notes by Capt. Mosse on Mr. Hick's "40 years among the wild animals of India" have induced me to give a few details and make a few suggestions on the subject of game preservation.

Owing to the courtesy of a former Manager of the Court of Wards, I had, in 1911, the opportunity of shooting in one of the largest of the Zamindarys of the Central Provinces. My primary object was to secure a couple of good heads of that fast disappearing race—the C. P. Buffalo—and anything else, provided it did not interfere with my securing these.

The Zamindary has an area of something over 2,500 square miles and I had the opportunity of going over some 1,500 of this and in the localities where it would not be unreasonable to expect to see game fairly plentiful. If it had been during the cold weather that I went over this splendid piece of country, there might have been the argument—difficult to overcome—that one could not expect to find game universally plentiful over such a large area of, except for village sites and deserted village sites, uninterrupted jungle. I was however there during the months of April, May and June. At that time of year till the break of the rains, water is very scarce and there are frequently several miles between one patch of water and the other and if there were game about, their tracks would be found at the water. Although continually about before sunrise, I did not come across a single chital and only once a sambar and that was on the borders of Government forest whence it had come a few hundred yards to feed and where it returned at daybreak. There were several things which appeared to me to be conducive to this state of affairs.

(1) *The Native licensed to have a gun.*

In order to show how this man does the greatest amount of harm and the least amount of good: I should note that in this part of the country there is one harvest of rice, which is sown at the commencement of the rains and reaped in September or October. Protection of crops is the excuse for a gun in many cases and a very legitimate excuse too, provided the use of

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

the gun was limited to that. Shooting animals over crops gives both man and animal a sporting chance, anyhow in the estimation of the native and neither crops nor animals would be much the worse. The native however looks a bit further ahead and works out the simple problem that if there are no animals to shoot there will likewise be none to eat the crops. He, therefore, during the hot weather, when water is an absolute necessity and sport (for him) an absolute certainty, sits over the very limited numbers of water holes and makes use of his gun till there are no animals left to shoot. Now it appears to me that there are not insurmountable difficulties to get over and that a little local and if not sufficient, provincial legislation would make this state of affairs impossible. Let the protector of crops have his gun while his crops are in the ground and until they are reaped, which in most cases would be for four months—June, July, August and September. Let the native shikarry also have his gun for those four months as well and he will be able to pit his cunning against that of the unfortunate deer and the results of his labour will be sport and not slaughter.

(2) *The village nets.*

These nets, kept in every village inhabited by Mariahs, and in many other villages as well, are capable of catching any thing from a sun bird to a full grown Nilgai. It is probable that these are not on view in the same way when an official of the district is on tour, but in no case did they consider it necessary to put them away on my approach. I met a Mariah one day in the jungle and he explained their method of shikar with nets. Villages band together, bring out all their men and all their nets. After having arranged the nets in a run where animals pass, the jungle is beaten towards these and any flesh is good for the Mariah pot. The man told me that they had had a large beat a few days before, for miles around, but had not seen anything. It is not difficult to understand that game of all sorts under these circumstances must soon cease to exist. As far as I could ascertain the sale of flesh is not the object in these wilds, but the animals secured are divided with strict impartiality between those concerned in the beat. I was a witness of one of these partitions and the sport obtained was a jungle cat, a most unwholesome looking animal, but this was carefully divided up and put on leaves in a row. Nothing was wasted and the last of the flesh was being scraped off the cheek and carefully put aside for some one when I came up.

No doubt animal product is the property of these primitive jungle fellows, but their methods are those of extinction and if they are not restrained all animal life is bound to die out. The thriftless constructor is prevented from ruining the jungle at the expense of Government or the State and in his own interests the jungle man should be restrained from exterminating game on which he partly exists.

I also had occasion to see how birds fared at the hands of these ignorant

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

folk. Within a few miles of where I was one day camped, the pugs of a tiger had been seen in a dry water course in which there were two small pools of water where apparently the animal had drunk on the previous night. I intended to tie up in the water course and see if I could get the tiger. I went down in the afternoon and found that round the first pool branches of trees had been arranged to scare birds and prevent them from drinking there. At the second pool the same had been done and also a small hut of green boughs had been erected a few yards from the pool. In this case, however, a wet patch of sand had been left to entire thirsty birds on a sultry afternoon in the middle of the hot weather. Hidden just under the surface of the sand, was a jointed wooden frame working in the same way as a spring trap, with fine netting on either side of the frame. This frame was connected by a long cord to the hut in which the bird catcher and his son sat. By pulling the cord, any unfortunate bird up to the size of a peacock was secured the moment it put its feet on the enticing piece of wet sand. There is nothing to prevent the jungle man catching his birds in this manner and one might just as well talk to him of the evolution of the æroplane as attempt to reason with him concerning extermination. When I got up to the pool I asked to see what sport they had had and in the hands of an urchin of some 8 summers were the plucked remains of 3 unfortunate still-fluttering birds, one of which was the beautiful male *Pitta brachyura*. I put an end to their sufferings as speedily as possible. I felt it my duty, although I cannot flatter myself that it would have any lasting effect, to protest against the needless barbarity of plucking these unfortunate birds alive and after thoroughly explaining to the man my reasons, destroyed the trap. I sat up that evening and no tiger came, but the hen of this lovely thrush (*Pitta brachyura*) was hopping round picking up insects and with those dark patches like large tear drops looked as if she was mourning the cruel fate of her mate.

A plea for the Central Province buffalo.

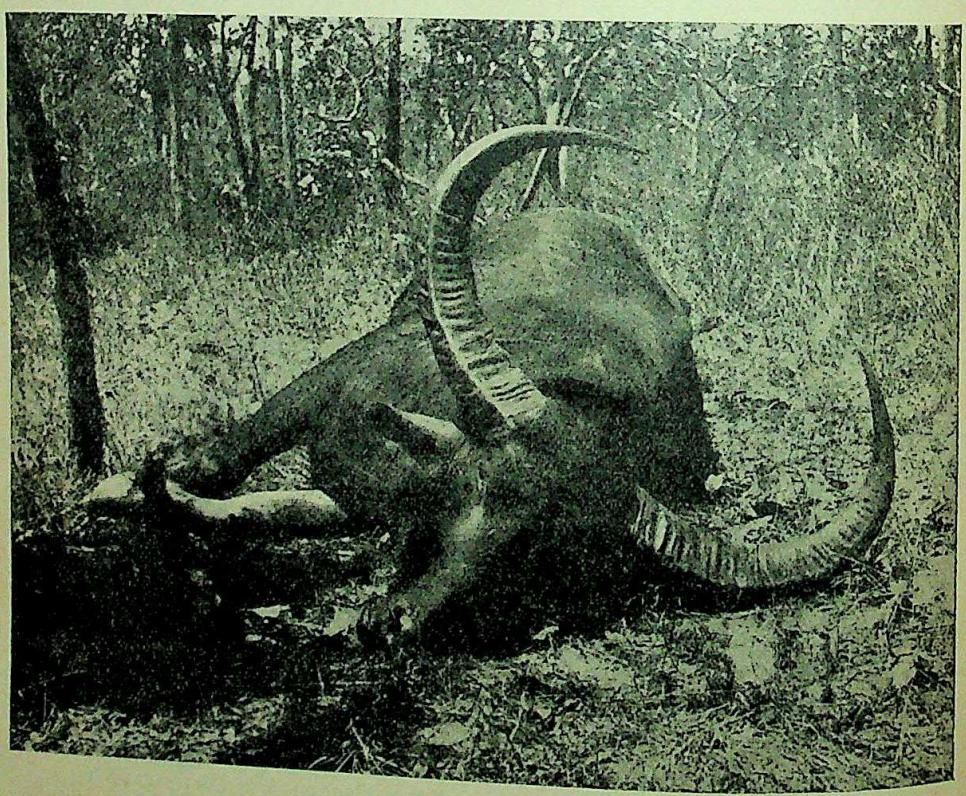
I do not think any one will dispute the fact that this splendid animal is fast disappearing and sportsmen of former years would turn in their graves were they be acquainted with the conditions that now exist.

In conversation with a well known sportsman, a forest officer, some time ago, the subject of preservation of buffalo cropped up, and I remember him saying that it was very disheartening, as a stock of these animals may have been preserved and looked after for years only to be wiped out by some cattle disease which may attack them at any time. It appears to me now that this risk might be lessened and possibly entirely avoided the part of the country frequented by these animals consists of undulating plains of grass and scrub jungle and are the grazing grounds of thousands of cattle brought into the country from the Deccan by "Banjaras" (a

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

wandering tribe) at the commencement of the hot weather and they remain till the break of the rains. There is not a corner of this vast area, where there is grazing, where these men and their herds do not penetrate. If cattle disease were introduced, it would more likely emanate from these cattle than from any other source. But these wandering tribes having paid their 2 annas a head (I think it is) for each animal are at liberty to wander at will and it is difficult to disassociate poaching, theft, or any other rascality from a member of a wandering tribe, although cattle-grazing may be his ostensible means of livelihood. There are parts of a jungle where buffalo will remain throughout the year, provided they are not rudely disturbed and there are parts which they never frequent or only pass through during the rains. Knowing these areas, surely it would be possible to close those they frequent to all grazing, and the areas would not be very large. This would give the buffalo a chance, his water would be left alone and the chance of him being killed off by cattle disease would be greatly diminished. I obtained one head of the C. P. buffalo a photo of which may be considered sufficiently interesting to reproduce in the Journal. I have no intention of visiting this part of the country again, but if what I have seen, and any



CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

suggestion I have made would lead to preservation of game, especially of the buffalo, I shall not have written in vain.

ST. G. de CARTERET.

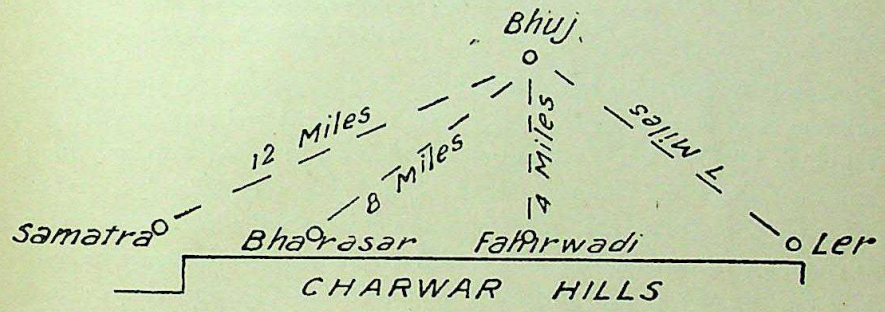
July 1912.

No. XXXIV.—NOTES ON CUTCH AMMONITES.

II

In my last notes, on the Fakirwadi Belteram beds, I drew attention to the peculiar arrangement of the hills bordering the great Cutch fault. They fall into a string of circles, semicircles and curves so much so that one is sometimes inclined to think that there is not so much fault here as a steep dive of the North side of an anticline under the later beds. However in other places the fault theory seems more probable. Possibly the formation of the fault had a good deal to do with the circling of these hills.

This ' Circling ' is not confined to the Fakirwadi beds.



At each of the places named, Samatra, Bharasar, Fakirwadi and Ler I find the Ammonite ridges or hills turned in curves or circles, the North descent of the anticlines being often visible (perhaps only as a low broken off outcrop) dipping steep North and often clean gone, as if the curved hill had been shorn down across its middle by a fault.

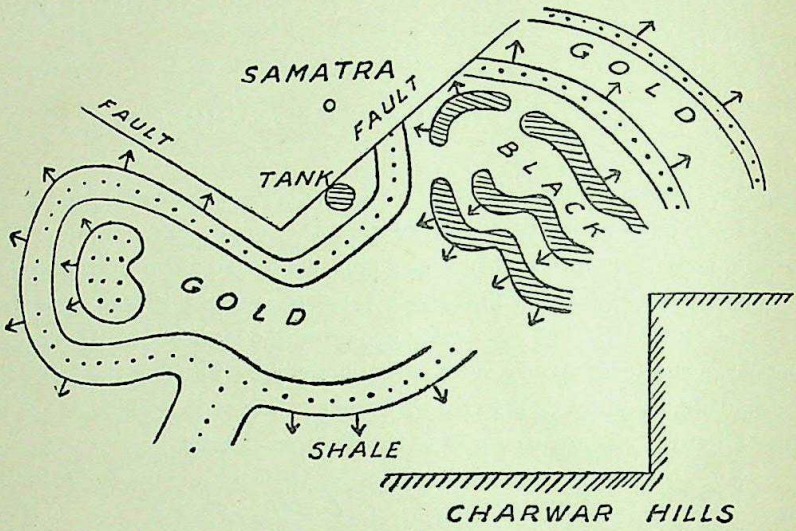
Of Ler more later : of Fakirwadi I have written : of Bharasar this much at present : the outcrop here bends round at its East extremity in a most graceful curve : you might call it the end of a stadium. The South side dives under Charwar, the East dives down Eastwards, and the North side dives down to the North for a few hundred yards and then disappears. How far the Southerly exposure extends towards Samatra, I cannot say ; I have followed it out for about 1½ miles, and it was still running Westward when I left it.

To-day I write of Samatra, which again has its circle or stadium. The shape of the Samatra outcrops of Ammonite beds is roughly this. A sort of 2 mile long stadium. Its beds dip quaquaversally, but I am not quite sure how far they extend to the South-East and South-West. All the

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

West side is a plain of golden yellow soil, except where a basalt intrusion has forced up the rock (and hardened it) into a biggish pile of hills.



From this mass of hills the yellow fields and slope away to the East, till crimson black slabs come sloping up from under the yellow fields and rise into high hills at the East end of the stadium, break off into very rough and tumbled ground and sink down again below a broadish yellow belt. Here too in one place are some hummocks of basalt, the intrusion of which is probably responsible for the upheave. At the South-East corner the hills rise up and join a projecting angle of the Charwar range: but I have not yet had time to study the junction point.

To the West and South except for a South-West extension for a long way not yet mapped the wet blanket of shale-coated with small broken red stone covers up the warm yellow beds, just as it does on the South side of the Fakirwadi beds: on the North side, the line of the fault is visible, hard cold coarse sandstone dipping South, *i.e.*, against the Ammonite dip. To the East the yellow beds of Ammonite extend to some distance yet fully explored. I call the shale beds a wet blanket because you may hunt for hours in them and find nothing.* Its deposition seems to have cut off all (shelly) life.

* In a bit of coarse sandstone of the *upper* Jurassics lying apparently a fair height above the shale beds I have to-day fou d the relics of an Ammonite so perhaps *Ammonites* did struggle through the shale period: anyhow they must have done so to continue through into Cretaceou- times, unless as I sometimes think these masses of shale beds and upper jurassic sandstones are contemporary with the European cretaceous deposits. But there has been an intrusion of basalt not far off the spot, which may have carried up some of the Ammonite rocks through the overlying shale and sandstone left this waif here.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

One peculiar feature of the ground is the curve which indents the North side. There are several low parallel walls—the outcrops of the harder Ammonite strata—running along the North edge; but they curve at right angles at this point: each of them—as do also the sandstone beds to the North. There was a bad kink in the fault here.

We must then suppose that at one time the whole stadium was a vast hill; all its centre has been eroded, and has probably become much more so in the last 31 years: anyhow a very low ridge is marked in the Trigometrical Survey Map which certainly doesn't deserve a contour line, now but then other hills deserve a contour line, which do not get it.

Basalt heaved up the West end: basalt heaved up the East end. Now the hills of the East end are of crimson-black rock, weathering on their inner faces into light yellow grit, while their broad slabby backs remain black and grim as contrasted with the golden yellow of the main stadium. They are of lower, earlier, deposit: and I presume Dr. Waagen refers to these when he writes of the *Anceps* beds of Samatra. I found two or three *Anceps* among them and several other *Interrupti Perisphinctes*, which I could not name. They also contain many biggish flat broad-trimmed *Ammonites* for which I can get no satisfactory name from the list of those supplied to Dr. Waagen.

The lowest beds visible in the lowest part of the hollow of the Eastern clump of hills seem to be of a dirty white sandstone—beds lying almost level—with, it seems, no fossils. Above them belemnite bearing rocks appear: these also contain very big *Rhynchonellæ*. At one spot on the outer edge of these black rocks there is a whole swarm of these big *Rhynchonellæ*. Embedded in the black rocks on the slabby side can be seen many big specimens, much worn and inextricable. One looked to be a long ribbed *Stephanoceras*. Another specimen was a big *Aspidoceras* (as far as I could judge). Its upper surface was worn almost flat and squat with the rock: I barely noticed it: but I did and I set to work carefully and long. As I removed the surrounding matter, it broke up. On unearthing a big outer fragment, I found strong straight even ribs, which from its shape and volution pointed to an *Aspidoceras*. It was 22 inches across and I much lamented its loss.

A big *Rehmanni*† was also found not far off. Above the black rock comes the golden yellow, which I consider to be *athlete* beds for in the lower parts of the deposit I found many *athlete* fragments. There were also large numbers of *Perisphinctes rota* many *Per. dhosaensis*, great numbers of fragments of *Stephanoceras opis* (at least I can see no other *Stephanoceras* in Waagen's book to which these fragments answer): unfortunately I found no specimen with inner whirls: *Stephanoceras polyphemus, tumidum*, and *diadematum*, *Per. curvicosta*, *angigaster*, and *Indogermanus* and

† Now in the B. N. H. S. Museum: a fine big fellow.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Harpoceras eairense and *dynastes*. One well preserved *Echinolampas* (*discoides ?*) was found here too; if the identification hazarded by Mr. Stone is correct, this is a rarity in so low a bed.

In the hills on the west of the Stadium there is one corner in which good specimens of *Harpoceras Dynastes* abound. And another odd feature of these West hills is the great abundance of small *Ammonites*, evidently cut off by early death: perhaps the basalt rose and poisoned or heated the water while these beds were still forming, for these seem to be the highest of the ammonite beds here exposed. Their flat slabby backs slope down to the cold red stone beyond.

There are hundreds—probably thousands—of these immature examples exposed, though the majority are in fragments. I cannot be sure yet of any having their body chamber preserved; but there is no sign of any outer whorl having covered those now exposed. I promise myself and Mr. Stone an exciting time in examining these and guessing into what class of monster each would have grown.

And so this chapter of ancient life seems to begin in a jump with plate-like *Ammonites*, *Belemnites* and big *Rhynconellæ*. Probably their ancestors lie crushed and powdered in the dirty-white rock of the lowest visible stratum. And they pass on through centuries of evolution into slightly varying forms, the old ones dying out and leaving descendants unlike themselves to start ever more widely differing branches. Suddenly while the waters are teeming with the life of these beautifully-shelled animals, there comes a bubbling up of hot or poisonous basalt. The waters get hot or poisonous and kill off all. The mud, till now flat and level, is heaved up into mounds and hills, and the whole mass is raised above water level into a small island.

One more point for notice: the Fakirwadi upper beds overlying the reefs with Samatra like species, contain many *Perisphinctes*, *Oppeliæ* and *Phyllocersa*: but the Samatra beds have not yet these upper layers: I have found none of the *Perisphinctes* so common to the upper Fakirwadi levels. (*torquatus*, *Katrolensis*, *Pottingeri*, &c.): possibly a few *Oppeliæ* in the Samatra upper beds, but so worn as perhaps to be *Harpocersa*: and one possible *Phylloceras* which refuses to budge from his compact rock-setting. So I think we may assume that these Samatra beds were clear of the water when the upper Fakirwadi beds were being laid down under water. But where did the water-line come? If it still washed the base of the hills sketched above, the *Oppeliæ*, *Phylloceras* and later *Perisphinctes* should be found under the cold red-stone shales round the edges of the raised island. This question must be solved by a close examination of the nullahs cutting through the cold red-stone shales; and this must wait a bit.

J. H. SMITH.

BHUJ, CUTCH, *July* 1912.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

P. S.—The *Nautilus* and *Ammonite* specimens have been, as far as possible, identified by reference to Dr. Waagen's work on the Jurassic Cephalopoda of Cutch. (Pal. Indica Ser. IX. 4. vol. I. Pts. 1-4.). Several specimens discovered do not seem to tally with any given in Dr. Waagen's work: these are now awaiting identification.

Among the specimens from Samatra, as yet identified by Mr. F. H. Stone, are the following :—

Belemnites grantianus[1].	Stephanoceras tumidum[3].
„ gerardi.	„ polyphemus.
„ katrolensis[2].	Perisphinctes hians[4].
„ sauvanausus.	rehmanni.
Amaltheus schaumburgi.	curvicosta.
Harpoceras dynastes.	sparsiplicatus[5].
„ lairense.	angygaster.
Peltoceras athleta.	dhosaensis.
„ bidens.	omphalodes.
	Also a Pleuromya.

NOTES :—(1) *Belemnites grantianus* is mentioned in R. D. Oldham's Manual of the Geology of India, page 224, also in a footnote on same page as having been overlooked by Dr. Waagen in Jurrassic Cutch Pal., Indica Series IX.

(2) *Bel. katrolensis* being found in these beds shows that this species had its origin earlier than was known to former surveys.

(3) *Steph. tumidum* found in upper Athleta or Dhosavolite (the dividing line is not clear to me) shows a later extension in time than was formerly believed. Dr. Waagen allocated it to *Macrocephalus* beds only.

(4) *Per. hians* also seems to continue much later than was supposed. It was formerly assigned to Putchum beds (Bathonia). Here it is found in Callorian.

(5) *Per. sparsiplicatus* was only known in Katrol beds. There is no sign of Katrol beds here.

* * *

Mr. R. C. Burton, of the Geological Survey, Calcutta, has kindly examined the large number of small Ammonites referred to in the above article. He, however, reports that the specimens are too badly preserved for safe identification. They are limonite casts. However, he is inclined to believe that several which I had marked "*Oppelia* ?" are real *Oppelia*, a point which is interesting, as *Oppeliæ* are so very rare (or absent) in the Samatra beds ; and these small specimens found in the upper strata may have been the præcursors of a revival of the family. Large swarms existed in the Katrol seas.

* * *

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Mr. Stone has added the following to my Fakirwadi list :—

Oppelia glabella.	Perisphinctes orion.
„ bicostata.	plicatilis.
Harpoceras lunula.	frequens.
„ ignobile.	chloroolithicus.
„ lairense.	Indogermanus.
Peltoceras bidens.	præcursor.
„ athleta.	euplocus.
Aspidoceras iphiceroides.	altiplicatus.
Stephanoceras subtumuidum.	rota.
„ diadematum.	sparsiplicatus,
„ semilæve.	spirorbis.
Also Monttivaltic chariensis.	jooraensis.
	leiocymon.
	angygaster.

On the other hand, some of my indentifications (Vol. XXI. No. 2) must for the present be crossed out, *viz* :—Opp. orientalis, Harp. trilineatum and hecticum, Asp. divrsiforme and Wynnei, St. maya, macrocephalum, and fissum and Per. paramorphus.

The Fakirwadi beds extending about 250 yards horizontally thus contain *Anceps*, *Athleta*, Dhosa Oolite, Kuntkote (?), and Katrol beds.

The question naturally arises as to what formation the masses of shale and sandstone which overlie the Katrol beds (Tithonian) belong to? Dr. Waagen in the G. S. I. Records, Vol. IV., Pt. 4.. 1871, moots this problem Are they Cretaceous, and included in the 3,000 feet thick Umia beds of Mr. Vredenburg's Summary ?

J. H. SMITH.

NO. XXXV.—AMMONITES FROM CUTCH.

This sketch is meant to outline the probable history of the area during the Jurassic period and later, and to explain some of the points raised by the author in his paper (page) entitled "Notes on the Cutch Ammonites."

In a Jurassic sea, the rocks containing the "Belteram" fossils were laid down. The sea was deep and little or no movement occurred in that area ; *Ammonitess*, *Belemnites* and other deep-sea forms flourished and their remains were entombed where they lived.

A period of protracted earth movement began, the sea commenced to shoal slowly, allowing a deposit of fine, argillaceous material to collect over the "Belteram" beds. These conditions were probably not favourable to the existence of the *Ammonites*, &c., and they therefore moved into deeper

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

waters and to places on the deep-sea bottom where the conditions were more congenial to them and deserted the places where they formerly lived.

Occasionally, during this period of slow elevation, movement was arrested, the sea deepened and for a space, similar conditions to those that prevailed when the "Belteram" zone was being laid down, induced a few *Ammonites*, *Belemnites*, &c., to return and the remains of some of them are found where they died. The uplifting movement began afresh and the survivors fled when the argillaceous material began to envelop them again.

As the sea shallowed sufficiently to bring the area within the "Thalassia zone" of deposit, the sandstones of the Upper Charwar Age and of the Upper Jurassic Epoch were laid down over the Charwar shales.

The processes of sedimentation and movement kept pace till all the beds of Upper Jurassic age exposed within the area were laid down and then the crushing was accentuated and folding, along an axis parallel to the existing shore-line began, resulting in an anticlinal fold that was faulted along its crest when the movement became more intense.

About this time probably, the Charwar range came into being along the fault-line, as a faulted shale anticline forming a sea-cliff. Denudation removed this cliff backward, the sea encroached and planed down the shales, exposing the in-lier of "Belteram," which now formed part of the sea bottom.

Boulders were torn from these beds by the waves and dragged back and forth and left at various points of the sea bed, composed of the white Bhuj sandstones. The sea floor was finally elevated and the "Belteram" beds exposed in intimate contact with the white sandstones, along a line of fracture down throwing to Northward, that ran along the Belteram anticlinal.

As the movement became concentrated and localized along the fault, a series of domes were formed along the fold and gave rise to the line of circular hills referred to.

The fault often cuts along the crest of the fold and the fossiliferous, dark crimson, vanguard ridges, are probably the lowest beds exposed within the area.

The "Belteram" in-lier itself, forms an elongated dome, allowing the overlying Charwar shales to come in against the fault in the Nulla beyond the Barapur road.

The shales and "Belteram" beds exposed on the Bhuj side and beyond Dhonsar, are evidently the same series that form the Charwar range and "Belteram" hills, outcropping from below the Bhuj sandstones across the fault.

H. J. DAVIES, F.G.S.

CAMP LEDAUNG, 17*th August* 1912.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

NO. XXXVI.—THE TRINOMIAL SYSTEM OF NOMENCLATURE.

To open any discussion on "nomenclatorial questions" is, we know, treading on exceedingly delicate ground, but the subject has recently assumed such vast importance for all Naturalists that, it is felt that the time has now come, when it can no longer be shelved.

In a very remarkable book entitled "A Hand-List of British Birds" by Hartert, Jourdain, Ticehurst, and Witherby (published by Witherby and Co., London, 1912), a most thorough attempt has been made by the authors to settle, let us *fervently* hope once and for all, the vexed question of nomenclature. Each bird has, in this work, been assigned its correct scientific name in conformity with the Rules of the International Commission of Zoological Nomenclature. That this will now lead to uniformity can hardly, we think, be doubted. The uniformity, however, to be useful must be universal, and this universality can alone be arrived at by a strict adherence to the *letter* of the Law of Priority, against which there must be no appeal. It is only too notorious that the existing confusion has hitherto arisen by authors having systematically disregarded this important principle and individual tastes and fancies thus having been given free play, the same bird has been redescribed under different names. In the circumstances is it surprising when we see in text-books a mass of synonyms tagged on to each species ?

That a large number of birds exhibit sub-species—by which term we mean not a "species in the making", but a "varietas geographica", a geographical race—will not be denied; and Ornithologists of the present day are fully alive to the great importance of the separation definitely of nearly allied forms of the same species. It is here that the Trinomial arrangement comes into play; and its use, not only helps us to speak with absolute precision of a particular race of birds, which have hitherto been binomially merged into other allied forms, but also helps to demonstrate scientifically the close relationship existing between geographical races of the same species.

The International Rules of Zoological Nomenclature clearly lay down how specific and sub-specific names shall, in the future, be accorded, and if universal uniformity is one of the desiderata, then there can no longer be any excuse for not adopting the principles everywhere. Henceforth (Article 2) the scientific designation of animals will be Uninomial for subgenera and all higher groups, Binomial for species, and Trinomial for subspecies. The Law of priority (Article 27) lays down that the *oldest* available name, even though it be inappropriate (Article 32), or "indicate characters contrary to those possessed by the animals in question" (Article 33) shall be adhered to. Doubtful cases, should any such arise, will have to be cleared by careful nomenclatures, with the help of the

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

International Commission, which discusses doubtful cases, and brings them up finally before the International Zoological Commission for decision. Unsightly tautonymy, such as *Apus apus apus*, or *Troglodytes troglodytes troglodytes*, is of no moment (Article 33).

As some doubts exist in regard to the use of trinomials for subspecies (geographical races), the authors of the "Hand-List" explain that when a species is divided into two or more races, or when two or more species are grouped as races of one species, then each of these races must have a trinomial appellation. It being impossible to say which is the oldest or parent form, the first named race of all those grouped under one species is, therefore, arbitrarily taken as the typical race, and its name becomes that of the species.

Applying these principles to a specific case, let us take that of the Raven as an example, and see how the revised nomenclature, in regard to the Indian birds, works out. The *typical* race of this Raven must, if it is to be distinguished from the Tibetan or Punjab birds, be designated *Corvus Corax Corax*, Linnæus. As Hodgson was the first Naturalist to describe the Tibetan race under the binomial "*Corvus tibetanus*", then this, we take it, becomes, under the new Rules, *Corvus corax tibetanus*, Hodgson Similarly as regards the Punjab Raven. Hume originally described this as "*Corvus lawrencii*", and it would now become *Corvus corax lawrencii*, Hume, and so on for other races.

This "splitting" of species will doubtless be very distasteful to the old school of "lumpers", but its advantages in leading to a more exact knowledge of the distribution of birds can hardly be overestimated. We notice that the reformed system of nomenclature has been adopted by Messrs. Baxter and Rintoul in their Report on Scottish Ornithology for 1911, and it is apparently only a question of time now before it comes into general use. That we must now all fall into line and revise our labels is inevitable, but will it be too much to hope that our Society will take early steps, in consultation with experts in Europe, to help their field workers by having the binomial system of nomenclature used by Blanford in his Aves thoroughly overhauled, and by issuing a Hand-List of revised scientific names as required by the International Zoological Congress ? In such a "List" the synonymy need be as brief as possible ; references being simply given, as in the "Hand-List of British Birds", to the earliest names, and the typical locality for the bird described under that name.

P. T. L. DODSWORTH, F.Z.S., M.B.O.U.

SIMLA, S. W., *22nd August 1912*.

[We understand that a revised list of the birds of India giving the various races is in preparation by one of our members at home.—EDS.]

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

No. XXXVII.—CRUELTY TO WILD FOWL IN SIND.

With reference to the note on this subject by Captain C. H. Elliot in the last Journal, page 1083, and to the editorial note at the end, the following satisfactory letter has been received by the Society from Mr. A. D. Younghusband, C.S.I., I.C.S., Commissioner in Sind, dated the 27th June 1912 :—

"I have the honour to refer to correspondence ending with your letter of the 12th February 1912, on the subject of cruelty to water fowl on the Manchur Lake, which has been very fully considered and discussed with the local officers.

2. I find that the question was taken up some years ago, resulting in the extension to the locality of the provisions of Section 62 of the Bombay District Police Act (IV of 1890) and of Section 3 of the Prevention of Cruelty to Animals Act (XI of 1890), which runs as follows :—

Section 62, *Bombay Act IV, of* 1890.

Punishment for Cruelty to animals.

62 (1) Whoever cruelly beats, goads, overworks, ill-treats or tortures, or causes or procures to be cruelly beaten, goaded, overworked, ill-treated or tortured any animal, shall be punished with imprisonment which may extend to one month, or with fine which may extend to one hundred rupees, or with both.

(2) Jurisdiction in cases arising under this section shall not be exercised by a Magistrate of lower rank than the first class unless such Magistrate be specially invested with jurisdiction for that purpose by Government.

Section 3, *Act XI, of* 1890.

Penalty for cruelty to animals in public places and for sale in such places of animals killed with unnecessary cruelty.

3. If any person in any street or in any other place whether open or closed, to which the public have access, or within sight of any person in any street or in any such other place—

(*a*) cruelly and unnecessarily beats, overdrives, overloads or otherwise ill-treats any animal, or

(*b*) binds or carries any animal in such a manner or position as to subject the animal to unnecessary pain or suffering; or

(*c*) offers, exposes or has in his possession for sale any live animal which is suffering pain by reason of mutilation, starvation or other ill-treatment, or any dead animal which he has reason to believe to have been killed in an unnecessarily cruel manner,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

he shall be punished with fine which may extend to one hundred rupees, or with imprisonment for a term which may extend to three months, or with both.

3. Difficulties have however been experienced in the practical enforcement of these provisions of the law. It is one thing to be able to state that cruelty has been practised. It is another thing to produce such precise evidence against a particular individual of all the facts required to constitute a technical offence as will suffice for his conviction in a criminal court. Moreover there are certain doubtful points connected with the interpretation of the law. Such doubts can best be determined by the institution of test cases, and attention is being directed to the desirability of instituting them whenever opportunity arises.

4. It has now been arranged that in future the annual licenses granted for the capture of water fowl shall contain express conditions prohibiting all such cruel practices as that of breaking the birds' wings while alive. A proclamation is in course of issue to the public of the locality, warning them that such practices are illegal, and that the law will in future be strictly enforced against all persons resorting to them. And the local subordinate officials are being instructed to see that the warning is not disregarded.

5. The matter is one in which the co-operation of visiting sportsmen will be specially welcomed by the district authorities, and I shall be grateful if you can help, in enlisting such co-operation. It would be of the greatest assistance if any visitor under whose notice an act of cruelty may come would (1) make a full note at the time, of all relevant facts, including the names and descriptions of the offenders and of any witnesses, (2) give immediate information to the nearest Magistrate or police officer, (3) report by letter to the Collector of Larkana."

We are sure that all bird lovers and sportsmen will appreciate the action of the Commissioner in Sind in regard to the above matter, and it is hoped that all sportsmen will co-operate with the district authorities as suggested by Mr. Younghusband.

September 3, 1912. EDITORS OF THE JOURNAL.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

PROCEEDINGS

OF THE MEETING HELD ON 27TH JUNE 1912.

An "At Home" of the members of the Bombay Natural History Society took place on Thursday, the 27th June 1912, Dr. A. H. Deane presiding.

NEW MEMBERS.

The election of the following 51 members since the last meeting was announced :—Capt. E. G. J. Byrne, Bombay ; Mr. E. C. H. Condon, M.I.E., A.M.I.C.E., Bandra, Bombay ; Rev. W. S. Sutherland, Kalimpong, Darjeeling ; Mr. S. H. Covernton, Larkhana, Sind ; Mr. M. T. Kennard, London ; Mr. C. Saunders, Calcutta ; Mr. J. B. Lloyd, Calcutta ; Mr. W. G. Leys, Bahraich, Oudh ; the Mess President, King's Liverpool Regiment, Lahore Cantonment ; the Principal, Larkana Madrassatul-Islam, Larkana, Sind ; the Honorary Secretary, Arthur Library, Castle Rock ; Capt. E.D.F. Kelly, England ; Mr. G. O. Allen, I.C.S., Mirzapur, U. P.; Capt. Gordon G. Jolly, I.M.S., Kacha, *via* Nushki, Baluchistan ; Mr. G. T. Barlow, Jhansi, U. P. ; Mr. Humphry Nevill, Phillaur, Punjab ; Major L. L. Maxwell, London ; Mr. G. N. Kingsford, C.E., Calcutta ; Mr. C. F. Reeve, Nasrapur, Poona Dist. ; Capt. L. A. Bethell, Dibrugarh, Assam ; Dr. S. N. Gore, L.M. & S., Agra ; Dr. J. M. O'Connell, Mannar, Ceylon ; Rev. H. Fairbank, Ahmednagar ; Mr. H. C. Robinson, Director of Museums, Kuala Lumpur, F.M.S. ; Maharaj Kumar Shri Vijayarajji, Bhuj, Cutch ; Mr. C. V. Birch, Bombay ; Lt. E. B. Fawcett, Port Blair ; Mr. John A. Wood, Kelantan, *via* Singapur ; Mrs. Leslie James, Mandalay, Burma ; Major B. E. M. Gordon, Manpur, *via* Mhow, C.I. ; Mr. A. Oliver, Swatow, China ; Rajkumar Hari Singh of Kashmir, Kashmir ; Mr. C. G. Stewart, Tharrawaddy, Burma ; Mr. Chas. Cook, Edinburgh ; Mr. H. H. M. Spink, Ahmednagar ; Capt. Norman Leslie, Darjeeling ; Major H. F. Thuiller, R.E., Ahmednagar ; Mr. L. Bishop, Hutti P. O., *via* Raichur, Deccan ; Capt. E. J. C. MacDonald, I.M.S., Balek, Abor Hills, Assam ; Mr. S. Hanhart, Bombay ; Mr. Frank E. Rice, England ; Mr. B. J. Gould, I.C.S., Gyantse, Tibet ; Mr. Alister Forbes, Bombay ; Mr. G. B. Lambert, I.C.S., Bijnor, U.P.; Mr. A. P. Kinloch, Pollibetta P.O., South Coorg ; Mr. L. P. Hutchison, Gonda, Oudh ; Mr. A. C. Tunstall, Calcutta ; Miss Annie L. Skinner, Honorary Secretary and Treasurer, Natural History Society of Malaya, Kuala Lumpur, F.M.S. ; Mr. J. C. Stodart, I.C.S., Pollachi, Coimbatore Dist. ; Capt. W. Paget Tomlinson, Bangalore ; and Mrs. T. W. Birkett.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

The Honorary Secretary, Mr. W. S. Millard, acknowledged the following contributions to the Museum, since the last meeting:—

Contribution.	Locality.	Donor.
1 Urial, *Ovis vignei* (alive) ..	Persia ..	Capt. F. W. Townsend.
1 Four-horned sheep, *Ovis aries* (alive).		
8 Takin, *Budorcas taxicolor*, heads.	Mishmi Hills ..	Capt. F. M. Bailey.
1 Unicorn Sheep, *Ovis aries* ..	Khatmandu, Nepal	Lt.-Col. J. Manners-Smith.
2 Wolves, *Canis pallipes* ..	Siripur, Saran ..	Mr. M. Mackenzie.
7 Jungle Cats, *Felis affinis* ..		
1 Common Indian Civet, *Viverricula malaccensis.*		
2 Jackals, *Canis indicus* ..		
1 Mungoose, *Mungos mungo* ..		
8 Hares, *Lepus ruficaudatus* ..		
Skin and skull of Hybrid Lion and Panther.	Kolhapur Gardens.	Col. F. Wodehouse.
1 Clouded Leopard, *Felis nebulosa.*	Sadon, Shan States.	Mr. Chas. Gray.
1 Skull of Lion, *Felis leo* ..	Junagadh Gardens.	Mr. L. Robertson, I.C.S.
1 Leopard Cat, *Felis bengalensis.*	Mongnai, Shan States.	Mr. L. E. C. Evarard.
1 Jungle Cat, *Felis affinis* ..	Ferozepore. ..	Mr. H. Whistler.
4 Skulls of Desert Fox, *Vulpes leucopus.*		
1 Jungle Cat, *Felis affinis*	Motihari, Champaran.	Mr. J. S. E. Walker.
1 Fishing Cat, *Felis viverrina*		
1 Jungle Cat *Felis affinis* ..	Chakdara ..	Capt. H. Graham.
*2 Chital, *Axis axis* (alive) ..	Kanara ..	Mr. G. C. Shortridge.
1 Bear Cat, *Ælurus fulgens* ..	Silchar ..	Mrs. F. E. Jackson.
2 Jakals, *Canis indicus* ..	Akola, Berar ..	Mr. C. H. Dracott.
1 Hyæna, *Hyæna hyæna* ..		
1 Wild Boar, *Sus cristatus* (variety.)	Cutch ..	H. H. Rao of Cutch.
1 Jackal, *Canis indicus* ..		
4 Tiger, *Felis tigris* Cubs, fœtal specimens.	Mudhol ..	H. H. The Rao Saheb of Mudhol.
6 Hares, *Lepus nigricollis* ..	Nilgri Hills ..	Mr. Chas. Gray ..
1 Ratel, *Mellivora indica.* ..	Hoshangabad ..	Capt. W. F. Maxwell.
1 Black Buck, *Antilope cervicapra.*	Wadhwan ..	Mr. S. A. Stripp.
6 Bats, *Rhinolophus affinis* ..	Khatmandu ..	Lt.-Col. J. Manners-Smith.
8 Bats, *Scotophilus khuli* ..	Pusa ..	Mr. T. Bainbrigge Fletcher.
2 Spot-billed Ducks, *Anas pœcioerhyncha haringtoni.*	Taunggyi ..	Major H. H. Harington.

*Forwarded to the Victoria Gardens, Bombay.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Contribution.	Locality.	Donor.
1 Stiff-tailed Duck, *Erismatura leucocephala.* 1 Mallard-Shoveller (hybrid)	Srinagar ..	Mr. M. T. Kennard.
1 Swinhoe's Snipe, *Gallinago megala.*	Chingleput ..	Mr. I. S. Fraser.
1 Swinhoe's Snipe, *Gallinago megala.*	Dinvi Vanam, Madras.	Mr. R. F. Stoney.
1 Common Hill Partridge, *Arboricola torqueola.*	Khatmandu ..	Lt.-Col. J. Manners-Smith.
3 Eastern Bayas, *Ploceus passerinus.*	Bhutan, Duars ..	Mr. H. V. O'Donel.
3 Blue Winged Teal, *Querquedula circia.*	Wardha	Lt. W. A. Tucker.
1 Barn Owl, *Strix flammea* ..	Bandra	Mr. Windgate.
19 Duck Skins of various species..	Srinagar	Hon'ble H. G. O. Bridgeman.
3 Eggs of Grey Jungle Fowl, *Gallus sonnerati.*	Chanda	Mr. A. H. A. Simcox, I.C.S.
1 Egg of Bengal Florican, *Syphœtis bengalensis.*	Hasimara, Duars .	Mr. H. V. O'Donel.
1 Nest of the Tailor Bird, *Orthotomus sutorius.* 1 Nest of the Purple Sun Bird, *Arachnechthra asiatica*	Dinapur	Major J. W. L. Elgee.
2 Bird's Nests	Lucknow.. ..	Mr. J. Florence.
A large number of Fishes and Crustaceans.	Persian Gulf ..	Capt. W. F. Townsend.
2 Snakes, *Typhlops porrectus* .. 1 Cobra, *Naia tripudians* ..	Alipore	Major O. A. Smith.
4 Common wolf Snakes, *Lycodon aulicus.* 3 Brown Tree Snakes, *Dipsadomorphus trigonata.* 1 Chequered Water Snake, *Tropidonotus piscator.* 1 Common Krait, *Bungarus cœruleus,* 1 *Hypserhina sieboldi* and 4 Skins.	Pusa	Mr. T. Bainbrigge Fletcher.
Head of a King Cobra, *Naia bungarus,* which measured 16 ft. 4 ins.	Quilon	Capt. F. H. Branson.
5 Snakes and 3 Scorpions ..	Pasighat, Abor. Country.	Capt. R. S. Kennedy.
1 Johns Earth Snake, *Eryx johnii* (alive).	Ootocamund ..	Mr. C. B. Antram.
1 King Crab, *Limulus* sp.. ..	Akyab	Comdr. A. R. G. Willock, R.I.M.
22 Fresh Water Sponges ..	Various	Indian Museum, Calcutta.
A few Fresh Water Medusa ..	Satara	Do.
A number of Shells and Fossils..	Persian Gulf, Mekran Coast.	Capt. F. W. Townsend.
35 Butterflies	Ni giris	Capt. G. A. Hare.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Minor contributions.—Messrs. J. P. Paterson, Chas. Gray, C. Beadon, K. C. Macdonald, Capt. Massey, Mir S. Ali, C. E. Traylen, Major H. Robertson and Mr. P. F. Gomes.

MAMMAL SURVEY.

Grant from Bombay Government.

The Secretary announced that he had just received a letter from the Government of Bombay intimating that Government had been pleased to sanction a special grant of Rs. 2,500 towards the funds for the Mammals Survey.

The survey is progressing satisfactorily. Mr. Crump is at present at Chanda, C. P., and Mr. Shortridge in Mysore.

The Superintendent, Victoria Gardens, Bombay, exhibited some plants of *Hæmanthus multiflorus* in flower.

The Secretary exhibited a plant of *Peristeria elata,* the 'Dove' Orchid, in flower.

An "At Home" of the members of the Bombay Natural History Society took place on Thursday, the 26th of September 1912, Mr. T. R. Bell, I.F.S., presiding.

The election of the following 37 members since the last meeting was announced:—Mr. G. M. McCleverty, Dehra Dun, U. P.; Mr. E. Lane, Koderma, P. O.; Mr. W. E. Kidner, R. E., Bombay; Mr. G. N. Frattini, Bangalore; Dr. E. H. Hankin, Agra; Mr. H. Gill, Kallini P. O., Cachar; Capt. W. G. Meale, I.A., Mount Abu; Mr. W. W. Phillips, I.C.S., Madras; The Librarian, Gauhati Club, Assam; Mr. Aga Shah Rookh Shah, Poona; Mr. Carl Meyer, Rangoon; Capt. C. H. Barbar, I.M.S., Banda, U. P.; Dr. A. D. Cunnyngham Perdriau, Narsinghpur, C. P.; The Mess Secretary, R. A. Mess, Meerut; Major H. N. Holden, Jaipur, Rajputana; Mr. B. L. Clarke, Quetta; the Honorary Secretary, R. A. Mess, Cambellpore; Major James Davidson, I.M.S., D.S.O., Dehra Dun, U. P.; Mr. E. D. Knowles, Purulia, B. N. Ry.; Mr. T. R. Rearden, England; Capt. T. L. Bomford, I.M.S., Calcutta; The Mess President, The Border Regiment, Maymyo; Mr. E. H. P. Jolly, I.C.S., Jalgaum; Mr. E. Ferry, Benares; Mr. E. L. Mahon, Pollibetta, South Coorg; The Principal, Madras Forest College, Coimbatore; Major A. D. Kirby, R.F.A., Allahabad; Mr. H. Jouquet, Dehra Dun, U.P.; Mr. F. C. Chamier, I.C.S., Mirzapur; Mr. E. A. Macnee, Jubbulpore, C. P.; Mr. T. J. Tasker, I.C.S., Hospet, Dist. Bellary; Mr. S. H. Harman, Tavoy, L. Burma; Mr. J. W. Bradly, Katha, Burma; Mr. V. A. Mackinnon, Mussoorie, U. P.; Mr. Donald Fraser, Bombay; Mr. B. S. Hickey, Tateriah P. O., Champarum and Mr. A. W. Botham, I.C.S., Shillong.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

The Honorary Secretary, Mr. W. S. Millard, acknowledged the following contributions to the Museum, since the last meeting :—

Contribution.	Locality.	Donor.
Panther (black variety) *Felis pardus.*	Siam	Mr. J. F. Keddie.
Desert Cat, *Felis ornata*	Cutch	H. H. The Rao of Cutch.
Burmese Civet Cat, *Viverra megaspila.*	Shan States ..	Mr. L. E. C. Everard.
1 Wolf, *Canis lupus*	Gumal, Baluchistan.	Lt.-Col. H. C. Bernard.
1 Tree-Shrew, *Tupaia* sp.? ..	Bhutan, Duars ..	Mr. H. V. O'Donel,
2 Large brown Flying squirrels, *Petaurista inornatus.* 4 Small Kashmir Flying squirrels, *Sciuropterus fimbriatus.* 1 Parti-coloured Flying squirrel, *Sciuropterus alboniger.* 8 Rats, *Epimys vicerex*, 1 Persian house mouse, *Mus bachtrianus* and several shrews and bats in spirit.	Simla	Mr. P. T. L. Dodsworth.
2 Squirrels, *Sciurus pernyi* ..	Siam	Mr. E. B. Howell.
15 Voles and Mice ..	Kashmir	Lt.-Col. H. A. F. Magrath.
2 Black naped Hares, *Lepus nigricollis.*	Coimbatore ..	Mr. C. E. C. Fischer.
Deformed head of Gaur, *Bibos gaurus.*	Kanara	Conservator of Forests, C. C.
2 Young Baral heads, *Ovis burrhel.*	Garhwal	Mr. J. C. Pickersgill Cunliffe.
6 Bird skins ..	Bhutan, Duars ..	Mr. H. V. O'Donel.
Masked Booby, *Sula cyanops* ..	Bombay Harbour.	Mr. E. R. H. Jockson.
White winged Wood Duck, *Asarcornis scutalatus.*	Siam	Mr. J. F. Keddie.
Scully's Wood Owl, *Syrnium indrani.* Eggs and nest of Orange Bullfinch, *Pyrrhula aurantiaca* and nest of Sooty Flycatcher, *Hemichelidon sibirica.*	Kashmir	Lt.-Col. H. A. F. Magrath.
2 Bird's Nests and Eggs ..	Garhwal	Mr. J. C. Pickersgill Cunliffe.
Eggs of Koklas Pheasant, *Pucrasia macrolopha.*	Jansar	Mr. A. Rodgers.
2 Young Monitors, *Varanus sp.?* ..	Ceylon	Mr. F. H. S. Stone.
Head of King Cobras, *Naia bungarus.*	Thayetmyo ..	Mr. A. Bailey.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

Contribution.	Locality.	Donor.
2 Young King Cobras, *Naia bungarus*. 1 Golden Tree Snake, *Chrysopelea ornata* and one black Krait, *Bungarus lividus*.	Tindharia ..	Mr. A. Wright.
6 Snakes ..	Sholapur.. ..	Mr. R. E. Macpherson.
1 Painted Tree Snake, *Chrysopelea ornata*. 1 Brown Tree Snake, *Dipsadomorphus trigonata*.	Kadra, Rajputana.	Mrs. Hume.
2 Snakes ..	Sikkim	Mr. C. H. Dracott.
11 Snakes ..	Jalpaiguri ..	Mr. W. L. Travers.
3 Snakes ..	Ootacamund ..	Mr. C. B. Autram.
Chameleon, *Chamelon calcaratus* (alive).	Nadiad	Mr. T. N. Jhaneri.
Young Hawks bill turtle, *Chelone imbricata* (alive).	Karachi	Capt. F. W. Townsend.
17 Fish and several other Lizards and spiders.	Charbar, P. Gulf.	Mr. W. D. Cumming.
1 Small crocodile, *Crocodilus porosus* (alive).	Kanara	Mr. G. C. Shortridge.
A number of frogs and toads ..	Simla	Mr. P. T. L. Dodsworth.
A number of insects ..	Singapore ..	Mr. F. H. Stone.
A large number of Butterflies ..	Nilgiri Hills ...	Capt. G. A. Hare.
Do. do. ..	Sikkim	Mr. C. H. Dracott.
A large number of Beetles ..	Charbar, P. Gulf..	Mr. W. D. Cumming.
Beetles and other insects ..	Maymyo ..	Capt. S. Pershouse.
Corals ..	Singapore ..	Mr. F. H. Stone.

Minor contributions from Messrs. S. A. Stripp, H. M. Dwane, H. V. O'Donel, E. Comber, J. F. Keddie, H. White, L. Bishop, L. Newton Davis, I.M.S., P.M.D. Sanderson, L. Robertson, W. R. Clarke, P. Gomes and J. F. Lopez.

MAMMAL SURVEY.

The Secretary said since the last meeting Mr. Crump had sent in 227 specimens from Chanda, C. P., and Mr. Shortridge 106 specimens from Shimoga and 331 from Vijayanagar (Humpi), Bellary District. Mr. Crump was now in Kathiawar collecting and Mr. Shortridge at Kolar, E. Mysore, from whence he proceeds to Coorg and the Malabar Coast. In regard to finances, the Government of India had kindly responded to the Society's appeal by giving them Rs. 7,500, which was very acceptable but would unfortunately not permit the Society to bring out a third collector, a very desirable course if the Survey was not to drag on for the next five years.

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

EXHIBITS.

Mr. Kinnear exhibited the specimen of mammals which had been named and returned by the British Museum.

The Secretary exhibited the following flowering plants new to Bombay :— *Mussænda erythrophylla* from Central Africa with bright crimson bracts (in contrast to the white bracts of the indigenous *M. frondosa*), *Solanum pensile* with violet and yellow flowers and *Odontodenia harrisi* with large pale yellow flowers and a salmon centre.

18,917

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

48917

CONTENTS OF THIS NUMBER—(*contd.*).

PAGE

MISCELLANEOUS NOTES—*contd.*

V.—Notes on the time of appearance and flight of Eastern Bats. By G. C. Shortridge 1321

VI.—The Habits of Voles. By Lt.-Col. H. A. F. Magrath. 1322

VII.—The Indian Buffalo (*Bubalus bubalis*). By G. C. Shortridge 1323

VIII.—Tsine (*Bibos sondaicus*) consorting with tame Cattle. By Major G. P. Evans 1323

IX.—Habits of the Kashmir Stag (*Cervus kashmiriensis*) in Summer. By Lt.-Col. H. A. F. Magrath 1325

X.—Abnormal type (?) of Eggs of the Little Forktail (*Microcichla scouleri*, Vigors). By P. T. L. Dodsworth, F.Z.S., M.B.O.U. 1327

XI.—Nesting of the Western Blue Rock Thrush (*Petrophila cyanus* Linn) in the neighbourhood of Simla, N. W. Himalayas. By P. T. L. Dodsworth, F.Z.S., M.B.O.U. 1328

XII.—The Himalayan Greenfinch (*Hypacanthis spinoides*). By Lt.-Col. H. A. F. Magrath 1329

XIII.—Early arrival of the Grey Wagtail. By J. Donald, I.F.S. 1329

XIV.—Eggs of the large Hawk-Cuckoo (*Hierococcyx sparverioides*). By A. E. Osmaston..... 1330

XV.—Question whether *Gypus fulvus*, Gmelin, the Griffon Vulture, occurs in the Himalayan districts of the Punjab? By P. T. L. Dodsworth, F.Z.S., M.B.O.U... 1331

XVI.—A Kite's Larder. By P. T. L. Dodsworth, F.Z.S., M.B.O.U..... 1332

XVII.—Tameness of great Indian Bustard (*Eupodotis edwardsi*). By R. Teague Jones, Indian Police 1333

XVIII.—Bustard in Kathiawar. By Major J. R. Carter 1333

XIX.—The great Indian Bustard (*Eupodotis edwardsi*). By A. B. Aitken..... 1334

XX.—The Masked Booby (*Sula cyanops*) in Bombay Harbour. By N. B. Kinnear 1334

XXI.—Baikal or Clucking Teal (*Nettium formosum*). By A. B. Aitken 1335

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CONTENTS OF THIS NUMBER.—(concld.)

PAGE

MISCELLANEOUS NOTES—*concld.*

XXII.—Is *Lycodon gammiei* (Blanford) an aberrant specimen of *Lycodon fasciatus* (Anderson)? By E. A. D'Abreu, F.Z.S. 1335

XXIII.—Notes on the size and breeding of the Common Green Whip-Snake (*Dryophis mycterizans*). By N. B. Kinnear..... 1336

XXIV.—Cobra Breeding at Parel. By Surgeon-General W. B. Bannerman, I.M.S., and J. B. Pocha, L.M. & S. .. 1337

XXV.—Breeding of the Common Green Viper (*Lachesis gramineus*). By N. B. Kinnear..... 1339

XXVI.—Saw-Scaled Viper (*Echis carinata*) as a Tree Snake. By Captain A. H. Mosse, I.A. 1339

XXVII.—Habitat of *Echis carinata*. By Capt. G. G. Jolly, I.M.S. 1340

XXVIII.—"Poisonous" Lizards in India. By H. F. Saunders.. 1340

XXIX.—The Food of A Bull-Frog (*Rana tigrina*.) By J. B. Mullan, M.A..... 1341

XXX.—Vitality of a Butterfly. By Capt. G. A. Hassels-Yates, R.G.A..... 1342

XXXI.—The Bed Bug (*Cimex rotundatus*) on the Common Yellow Bat (*Scotophilus kuhli*). By K. Kunhi-kannan, M.A., F.E.S. 1342

XXXII.—Flies on Snow. By Lt.-Col. H. A. F. Magrath 1342

XXXIII.—Preservation of Game. By St. G. deCarteret 1343

XXXIV.—Notes on Cutch Ammonites II. By J. H. Smith 1347

XXXV.—Ammonites from Cutch. By H. J. Davis, F.G.S. 1352

XXXVI.—The Trinomial System of Nomenclature. By P. T. L. Dodsworth, F.Z.S., M.B.O.U. 1354

XXXVII.—Cruelty to Wild Fowl in Sind 1356

PROCEEDINGS 1358

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

BOMBAY NATURAL HISTORY SOCIETY

NOTICE.

Most of the back numbers of the Society's Journal are still to be obtained at the following rates :—

	Price to the Public.	Price to Members.
Vol. I.—		
No. 1 ..	Rs. 2 0	Rs. 1 4
„ 2 R ..	„ 2 4	„ 1 8
„ 3 R ..	„ 2 4	„ 1 8
„ 4 ..	„ 2 0	„ 1 4
	Rs. 8 8	Rs. 5 8
Vol. II.—		
No. 1 ..	Rs. 2 0	Rs. 1 4
* „ 2 ..	„ 2 0	„ 1 4
† „ 3 ..	Not obtainable.	
„ 4 R ..	„ 2 0	„ 1 4
	Rs. 6 0	Rs. 3 12
Vol. III.—		
No. 1 R ..	Rs. 2 0	Rs. 1 4
„ 2 R ..	„ 2 0	„ 1 4
„ 3 R ..	„ 2 0	„ 1 4
„ 4 R ..	„ 2 0	„ 1 4
	Rs. 8 0	Rs. 5 0
Vol. IV.—		
No. 1 R ..	Rs. 2 0	Rs. 1 4
„ 2 R ..	„ 2 0	„ 1 4
„ 3 ..	„ 2 0	„ 1 4
„ 4 R ..	„ 2 0	„ 1 4
	Rs. 8 0	Rs. 5 0
Vol. V.—		
*No. 1 ..	Rs. 2 0	Rs. 1 4
„ 2 R ..	„ 3 6	„ 2 4
* „ 3 ..	„ 2 0	„ 1 4
„ 4 R ..	„ 3 12	„ 2 8
	Rs. 11 2	Rs. 7 4
Vol. VI.—		
No. 1 ..	Rs. 2 0	Rs. 1 4
„ 2 ..	„ 2 0	„ 1 4
„ 3 R ..	„ 3 0	„ 2 0
„ 4 R ..	„ 3 0	„ 2 0
	Rs. 10 0	Rs. 6 8
Vol. VII.—		
No. 1 R ..	Rs. 4 0	Rs. 3 0
„ 2 ..	„ 4 0	„ 2 8
„ 3 ..	„ 4 0	„ 2 8
„ 4 ..	„ 4 0	„ 2 8
„ 5 ..	„ 2 0	„ 1 4
	Rs. 18 0	Rs. 11 12
Vol. VIII.—		
No. 1 ..	Rs. 4 0	Rs. 2 8
„ 2 ..	„ 4 0	„ 2 8
„ 3 ..	„ 4 0	„ 2 8
„ 4 ..	„ 4 0	„ 2 8
„ 5 ..	„ 6 0	„ 4 0
	Rs. 22 0	Rs. 14 0
Vol. IX.—		
No. 1 ..	Rs. 4 0	Rs. 2 8
„ 2 ..	„ 4 0	„ 2 8
„ 3 ..	„ 4 0	„ 2 8
„ 4 ..	„ 5 0	„ 3 6
„ 5 ..	„ 5 0	„ 3 6
	Rs. 22 0	Rs. 14 4
Vol. X.—		
*No. 1 ..	Rs. 5 0	Rs. 3 6
* „ 2 R ..	„ 5 12	„ 3 12
* „ 3 ..	„ 5 0	„ 3 6
„ 4 R ..	„ 4 0	„ 2 8
„ 5 ..	„ 2 0	„ 1 4
	Rs. 21 12	Rs. 14 4
Vol. XI.—		
No. 1 ..	Rs. 5 0	Rs. 3 6
„ 2 ..	„ 6 0	„ 4 0
„ 3 ..	„ 6 0	„ 4 0
„ 4 ..	„ 6 0	„ 4 0
„ 5 ..	„ 2 0	„ 1 4
	Rs. 25 0	Rs. 16 10
Carried forward	Rs. 160 6	Rs. 103 14

	Price to the Public.	Price to Members.
Brought forward	Rs. 160 6	Rs. 103 14
Vol. XII.—		
No. 1 ..	Rs. 6 0	Rs. 4 0
„ 2 ..	„ 6 0	„ 4 0
„ 3 ..	„ 6 0	„ 4 0
„ 4 ..	„ 6 0	„ 4 0
„ 5 ..	„ 2 0	„ 1 4
	Rs. 26 0	Rs. 17 4
Vol. XIII.—		
No. 1 ..	Rs. 6 0	Rs. 4 0
„ 2 ..	„ 6 0	„ 4 0
„ 3 ..	„ 6 0	„ 4 0
„ 4 ..	„ 6 0	„ 4 0
„ 5 ..	„ 3 0	„ 2 0
	Rs. 27 0	Rs. 18 0
Vol. XIV.—		
No. 1 ..	Rs. 6 0	Rs. 4 0
„ 2 ..	„ 6 0	„ 4 0
„ 3 ..	„ 6 0	„ 4 0
„ 4 ..	„ 6 0	„ 4 0
„ 5 ..	„ 2 0	„ 1 4
	Rs. 26 0	Rs. 17 4
Vol. XV.—		
No. 1 ..	Rs. 6 0	Rs. 4 0
„ 2 ..	„ 6 0	„ 4 0
„ 3 R ..	„ 6 8	„ 4 2
„ 4 ..	„ 6 0	„ 4 0
„ 5 ..	„ 2 0	„ 1 4
	Rs. 26 8	Rs. 17 6
Vol. XVI.—		
No. 1 ..	Rs. 7 8	Rs. 5 0
„ 2 R ..	„ 8 12	„ 5 8
„ 3 R ..	„ 6 0	„ 4 0
„ 4 ..	„ 7 8	„ 5 0
„ 5 ..	„ 2 0	„ 1 4
	Rs. 31 12	Rs. 20 12
Vol. XVII.—		
No. 1 ..	Rs. 7 8	Rs. 5 0
„ 2 ..	„ 7 8	„ 5 0
„ 3 ..	„ 7 8	„ 5 0
„ 4 ..	„ 7 8	„ 5 0
„ 5 ..	„ 2 0	„ 1 4
	Rs. 32 0	Rs. 21 4
Vol. XVIII.—		
No. 1 ..	Rs. 7 8	Rs. 5 0
„ 2 ..	„ 7 8	„ 5 0
„ 3 ..	„ 7 8	„ 5 0
„ 4 ..	„ 7 8	„ 5 0
„ 5 ..	„ 5 0	„ 3 6
	Rs. 35 0	Rs. 23 6
Vol. XIX.—		
No. 1 ..	Rs. 7 8	Rs. 5 0
„ 2 ..	„ 7 8	„ 5 0
„ 3 ..	„ 7 8	„ 5 0
„ 4 ..	„ 7 8	„ 5 0
„ 5 ..	„ 3 0	„ 2 0
	Rs. 33 0	Rs. 22 0
Vol. XX.—		
No. 1 ..	Rs. 7 8	Rs. 5 0
„ 2 ..	„ 10 0	„ 6 10
„ 3 ..	„ 10 0	„ 6 10
„ 4 ..	„ 10 0	„ 6 10
„ 5 ..	„ 4 8	„ 3 0
	Rs. 42 0	Rs. 27 14
Vol. XXI.—		
No. 1 ..	Rs. 7 8	Rs. 5 0
„ 2 ..	„ 12 0	„ 8 0
„ 3 ..	„ 12 0	„ 8 0
	Rs. 31 8	Rs 21 0
TOTAL ..	Rs. 471 2	Rs. 310 0

Nos. marked * are not obtainable by themselves but a few copies are reserved for purchasers of whole sets.

† Out of print.

APPLY TO THE HONORARY SECRETARY,

Bombay Natural History Society,

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

R. *signifies "Reprint" with no plates.*

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Arya Samaj Foundation Chennai and eGangotri

CC-0. In Public Domain. Gurukul Kangri Collection, Haridwar

Digitized by Google